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REPORT OF THE MILK COMMISSION

Appointed to Enquire into the Production, Care and
Distribution of Milk

1909

PRINTED BY ORDER OF
THE LEGISLATIVE ASSEMBLY OF ONTARIO



TORONTO

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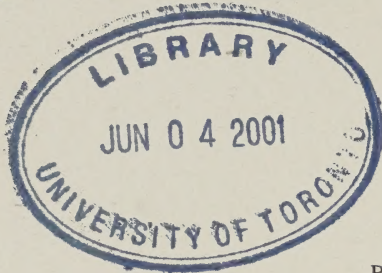
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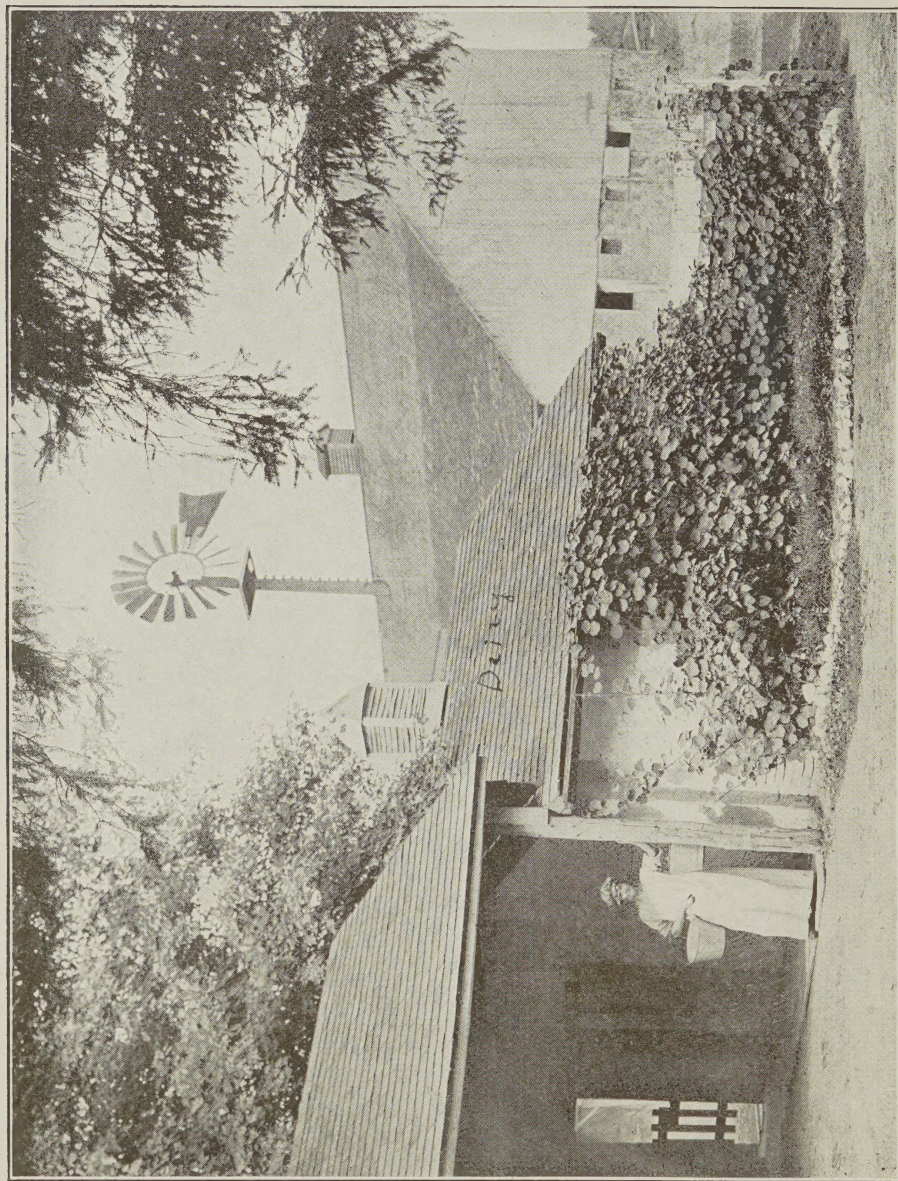
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Attractive Ontario Dairy Scene, showing neat separate milk house reasonable distance from stable.

CHAPTER I.

Being a Statement of the Formation of the Commission, the Importance of the Subject from the Standpoint of Health and Commerce and an Outline of the Plan of Enquiry.

Hon. J. S. Duff, Minister of Agriculture, Toronto, Ontario.

We, the members of your Milk Commission, hereby beg leave to submit our Report.

At the outset, we take the liberty of recalling to your mind the circumstances surrounding the instigation of the enquiry on which we have been engaged during the past few months. The ever increasing and world-wide attention which has been devoted to the question of safeguarding the milk supply in recent years found expression on the floor of the Ontario Legislature at its Session of 1909. On the first of April, W. K. McNaught, member for North Toronto, seconded by J. R. Dargavel, member for Leeds, moved that a Commission be appointed to investigate "the methods whereby clean, wholesome and sanitary milk is being successfully supplied to consumers in this or any other country and to make a report." This resolution was accepted by the Government and unanimously passed by the Legislature. In accordance therewith an Order-in-Council was approved on the fourteenth day of May, naming the Commission and setting forth their instructions as follows: "To enquire into the conditions and methods whereby milk is now being produced, cared for and supplied to the people of the Province for domestic consumption and manufacturing purposes; to investigate the methods whereby clean, wholesome, sanitary milk is being successfully supplied to consumers in this or any other country, and to make a report as to their findings in the matter, together with such recommendations as may be considered advisable."

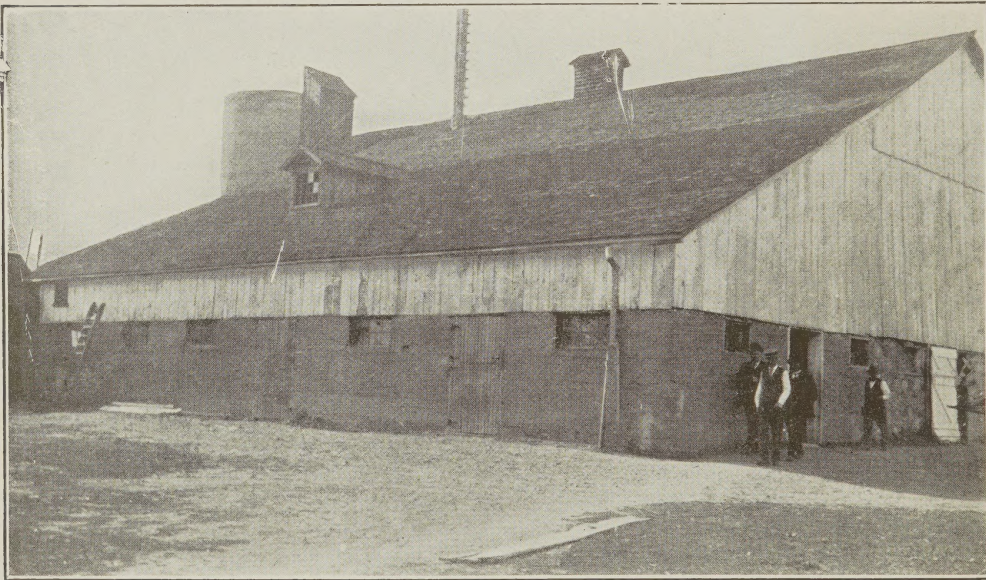
MILLIONS INVOLVED IN DAIRY INDUSTRY.

A preliminary word may be said as to the vast importance of the milk question judged both from the standpoint of commerce and of health. According to the latest available figures there are 1,200,000 milch cows in the Province. That in itself represents an investment of approximately \$40,000,000, not including the value of the stables, milk houses and other equipment. In 1908, there were 1,177 cheese factories and 97 creameries, to which were delivered 166,103,975 gallons of milk. This was made into 120,624,436 pounds of cheese and 9,895,109 pounds of butter, representing a value of \$13,106,919 and \$2,355,170, respectively, aggregating \$15,462,089. In addition, there is the large quantity of butter made on the farm and sold direct to the market, of which no estimate can be made. Then, there is the milk which is sold for immediate human consumption, and almost every person uses milk in some form or other and to greater or lesser extent. On the basis of figures furnished by some Ontario cities, it is estimated that 36,464 gallons are used per day in the eighteen cities of this Province, with a combined population of 687,814. At an average of 13 cents per gallon, this means \$1,630,216 to the dairy farmers supplying cities each year. As 26 cents a gallon is a moderate estimate of the amount paid by the consumer, it will be seen that the city milk supply represents another \$1,630,000 annually to the vendor and middleman. At the same ratio for the entire Province, supplying milk would mean an annual revenue of \$6,120,320 to the producer, but as the consumption in rural districts very greatly exceeds the average in the city, the sum must be placed far in excess

of that amount. Altogether, it seems well within the mark to say that dairy products are worth to this Province each year \$45,000,000, giving employment to thousands, affording a large market for foodstuffs, and, in turn, giving back fertility to the soil and paying interest on an investment of over fifty million dollars, exclusive of the land.

THE GOSPEL OF THE GERMS.

But, more important, and likewise more intricate, is the question of the milk supply in its relation to public health. In the scientific world there has perhaps been no more remarkable development in recent years than that which concerns bacteriology and the manner in which these germs may be conveyed by water, milk and other carriers. Bacteria were discovered by Antony von Leenwenhock in Hol-



Typical Ontario Bank Barn.

land about 1675. He was a linen draper, as history records, but his hobby was grinding lenses, and one day he constructed a microscope of greater power than any previously manufactured. With the aid of this he discovered what he described as "animal-cules" in a few drops of water. While it seems to be agreed that that was the beginning of bacteriology, little progress was made in the ensuing two centuries. When Koch, in 1882, discovered the tubercle bacilli and introduced the "plate" method of media, he virtually started the modern school of bacteriology. Since that time the progress has been rapid and hundreds of books have been written and hundreds of men have devoted their lives to the work of research.

The chief carriers of bacteria are water, air, soil, milk and milk products. Milk, by its very nature, is one of the best and cheapest foods known, being made up as follows:—

	Per cent.
Water	87.2
Butter fat	3.7
Casein	3.
Milk sugar	4.9
Albumen .....	.5
Ash .....	.7

Cow's milk especially constitutes the food of infants because it more closely resembles mother's milk than the milk of any other animal, with the possible exception of the goat. But, unfortunately, milk has also been found to be one of the best mediums for the development and dissemination of germs, tuberculosis, typhoid, diphtheria, scarlet fever, being chief of the diseases which scientists have found to be conveyed by milk. Hence, while certain bacteria have proved of tremendous advantage in the making of cheese and butter, other bacteria have rendered the utmost vigilance essential in preserving milk in its natural purity. While milk is not often absolutely germless when it comes from the cow, experiments have proven it to be almost so, providing, of course, that the cow is healthy. Hence, since legislation follows the scientist, legislative bodies everywhere have directed their attention to devising plans for safeguarding the milk supply that the health of their people might be protected as well as their prosperity advanced.

INTEREST OF THE CONSUMER PARAMOUNT.

In undertaking, therefore, the enquiry of this question, it seemed to your Commission more a matter for personal observation than the taking of evidence. Being represented as most in need of attention, the supply of milk for human consumption has received chief attention. The menace of milk being measured to a large extent by the length of time elapsing between the time it is drawn and consumed, the problem resolved itself into one primarily affecting large centres of population. Here two courses were open: one consisted in making detailed examination of the conditions prevailing at each dairy farm and each distributing plant and bacteriological tests of the milk of each city. Such an exhaustive enquiry we did not conceive to be either practical or necessary. We were approaching the matter from the Provincial standpoint, not from the standpoint of any individual city or town. A study of the by-laws of each municipality, a general observation at first hand of conditions prevailing under such by-laws, a knowledge of laws and conditions in other countries and some attention to the scientific side of the question—these things seemed calculated to enable us to devise a provincial policy under which the various municipalities could secure a safe milk supply for their people. Accordingly, this was the line of enquiry adopted.

The subject we found was many-sided. It involves the practical knowledge of the farmer in the breeding and feeding of cattle and the handling of milk; the organizing and executive talent of the retailer; the hygiene of the sanitarian; the science of the bacteriologist, the veterinarian and the medical man, the safeguards of the health officer and the legislative powers of municipalities. Each of these speaks in a technical language more or less its own. While giving due weight to all interests, this report is drafted, not as a technical treatise, but with a view to the interests and understanding of the consumer, the average man who knows little about the difficulties of dairying or the intricacies of bacteriology, but who knows he wants clean, wholesome milk and who thinks he ought to be able to get it.

CHAPTER II.

Being a Resume of the Milk Laws of the Province and By-Laws of Cities, Together with some Facts and Opinions as to their Operation, and a History of the Medical Milk Commission Movement

To understand conditions and needs, it is first necessary to set forth present legislative enactments governing the "production, care and distribution of milk for human consumption and manufacturing purposes." Like all other Canadian laws, these come under three heads—federal, provincial and municipal. In matters of agriculture, under which dairying naturally comes, the Dominion and Provincial authorities have concurrent powers, the federal being supreme. The provinces, therefore, may make practically what laws they choose within reason. The municipalities, which receive their powers from the provincial legislatures, may make only such by-laws as are within the scope thereby delegated.

The production, care and distribution of milk being largely a provincial and municipal matter, it is not the subject of any extensive federal legislation. The Health of Animals Branch of the Dominion Department of Agriculture encourages good breeding by means of the "record of performances" and other agencies, combats contagious diseases, administers the quarantine regulations and has charge of the enforcement of the tuberculin test on animals for import or export. The tuberculin test consists in injecting a small quantity of tuberculin beneath the skin and taking the temperature of the animal at intervals both before and after. If the temperature rises to a certain degree, it is proof that the animal, in some part, suffers from tuberculosis. This is described as "reacting." The tuberculosis law provides that all cattle which have reacted to the tuberculin test shall be deemed to be affected with tuberculosis and shall be permanently marked as the Veterinary Director-General may prescribe. No reacting cattle shall be permitted to be exported. Imported cattle must be quarantined a week and tested, and if found to react, shall be permanently marked in the right ear with the letter "T" and released, except cattle from the United States and Mexico, which will be slaughtered. Cattle showing clinical symptoms of tuberculosis shall be destroyed or otherwise disposed of, as the Minister may direct. In addition, the Department agrees to supply tuberculin free of cost to anyone making application and agreeing to have his herd tested by a qualified veterinarian, make a report of the result to the Department and have reactors earmarked. No compensation is provided for.

Then, the Dairy Branch of the Federal Department of Agriculture, by contesting associations, cheese and butter experiments and other educational agencies, works to develop the manufacturing side of the dairy industry, especially butter and cheese for export.

Milk being a food, a general clause against adulteration is included in the federal Pure Food Act, and this clause, we understand, will be extended in the revision now being made by the federal authorities.

HISTORY OF PROVINCIAL LAWS.

It will thus be seen that the federal enactments affect but little and interfere not at all with the provincial and municipal legislation on the question. Alike because it is the higher authority and because this enquiry has proceeded from the

provincial viewpoint, the provincial legislation may be considered before municipal regulation. It is practically divided into two branches, one dealing with milk for human consumption, including vending in cities and towns, and the other dealing with milk for manufacturing purposes, including cheese factories.

The history of the provincial laws, as revealed by a study of the Statutes, may be briefly stated, but for purposes of reference it may be well to adhere to the legal phraseology.

The Consolidated Municipal Act of 1883 provided that Councils of cities, towns, etc., may pass by-laws: (46 Victoria, ch. 18, sec. 496, sub-sec. 49) "For appointing inspectors and providing for the inspection of milk, meat, poultry, fish and other natural products offered for sale for human food or drink, whether on the streets or in public places or in shops."

The Municipal Amendment Act of 1884, (47 Victoria, ch. 32, sec. 13, sub-sec. 10) repealed the above mentioned subsection and re-enacted it with additions in the words following: "For appointing inspectors and for providing for the inspection of milk, meat, poultry, fish and other natural products offered for sale for human food or drink, whether on the streets or in public places, or in shops, and for licensing and regulating milk vendors and for fixing the fee to be paid for such license at a sum not to exceed one dollar for one year."

From time to time, down to R.S.O. 1897, ch. 223, sec. 583, sub-sec. 23, the principles were practically re-enacted.

62 Victoria, 2nd sess., ch. 26, being the Municipal Amendment Act, 1899, by sec. 29 provides for the granting or refusing of a license to any person to carry on a particular trade, calling, business or occupation, under any of the powers conferred upon the Municipal Council or Board of Police Commissioners of any municipality, shall be deemed to be in the discretion of the Council or Board as the case may be, and the Council or Board shall not be bound to state any reason for the granting or refusing of such license; and by sec. 37 (2) of the same Act, power is granted to the Council to cancel licenses without stating any reason therefor.

The Act containing the power to grant and power to cancel without giving any reason for doing so, was assented to on the 1st of April, 1899.

63 Victoria, ch. 33, being the Municipal Amendment Act of 1900, repealed the absolute power given by paragraph 23 in section 583 of the Municipal Act, as amended by sub-sec. 2 of sec. 37 of the Municipal Amendment Act, 1899, substituting therefor the cumbersome procedure set out in section 37 of 63 Victoria, and re-enacted in the Consolidated Municipal Act of 1903, 3 Ed. VII., chap. 19, sec. 583, sub-sec. 23. Sec. 29, however, was not repealed, and is now found as 486a of the Municipal Act of 1903.

PROVINCIAL LAWS AS THEY ARE AT PRESENT.

The powers given by laws at present on the statute book relating to the question may now be considered. Under general powers delegated to local Boards of Health, "all milch cows and cow byres and all dairies or other places in which milk is sold or kept for general use, and all cheese factories or creameries shall be subject to regular inspection under the direction of the Board," the proprietor to obtain approval in writing and approval to be granted only after satisfactory inspection. The powers to be exercised under this clause, which is section 10 of the by-law set out in Schedule "B" to the Public Health Act, were further defined by amendments in 1900. These amendments, which are above referred to, empower municipal councils to pass by-laws licensing and regulating milk vendors.

Every applicant is entitled to such a license upon the production of a certificate, signed by the Secretary of the local Board of Health of the municipality in which such applicant resides, that he has complied in all respects with the provisions of Section 10 above quoted.

It also provides that "The premises of every person licensed under a by-law passed in pursuance of this paragraph shall at all times be open to inspection by any medical health officer or sanitary inspector of the municipality granting such license." For non-compliance with the provisions of section 10 above referred to, the license may be cancelled by the Board of Health of the municipality granting the license, providing the licensee lives in the same municipality. Where the dairyman lives in a different municipality to that granting the license, the health officer of that municipality and the health officer of the municipality granting the license must agree as a result of a united inspection within twenty-four hours after request of the Chairman of the Board of Health of the municipality granting license, before suspension is permitted. If they fail to "concur in the suspension," then "no such suspension shall take place unless it shall first be sanctioned by the Secretary of the Provincial Board of Health." Provision is made for appeal from the local Board to the Provincial Board. A license fee may be charged not to exceed \$1.00. Power is also given (3 Edward VII., chap. 19, sec. 550) to township, city, town and village councils to appoint inspectors of milk and other foods. Because of their bearing on the subsequent development of our enquiry, special attention is directed to the relative powers of the "municipality granting the license," and "the municipality where the licensee lives," and the necessity for concurrence.

The Statutes also tell a curious story in the clauses in reference to the tuberculin test. It appears that in 1896, (59 Victoria, ch. 63, sec. 4), in An Act respecting the Slaughtering of Cattle and the Inspection of Milk and Meat Supplies, power was given to local Boards to provide for testing cattle with tuberculin and disposing of them according to regulations thereafter to be decided by the Lieutenant-Governor-in-Council. Apparently no regulations were drawn up, and in 1897, (60 Victoria, ch. 14, sec. 75), a clause was added as follows: "The operation of this clause is suspended and no proceedings shall be taken under the authority of the said section until the close of the next session of the Legislature." In 1898, (61 Victoria, ch. 23, sec. 22), the same enactment was passed deferring it for another session. The reiteration of the clause in the Statutes of 1899 (62 Victoria (2), ch. 26, sec. 53), showed that "wait until next session" was still the policy, while in 1900, (63 Victoria, ch. 33, sec. 38), the postponement was repeated and further elaborated with a clause setting forth that "to remove doubts it is hereby declared that Section 4 is not and never has been in force," added no doubt as the suspending clause was not enacted in the first session of 62 Victoria. Then the matter seems to have been lost sight of, and although it has never been repealed, no attempt has been made to enforce it.

There is at present no standard in the Ontario Statutes defining the butter fat quality of milk, either for human consumption or manufacturing purposes. Clause 3 as to adulteration may be quoted in full as follows: (ch. 252, R.S.O. 1897.)

"Any person who knowingly and fraudulently sells or supplies to any person any milk diluted with water, or in any way adulterated, or milk from which any cream has been taken or milk commonly known as "skimmed milk," or who keeps back any part of the milk known as "strippings," or who knowingly and fraudulently sells or supplies to any person milk that is tainted or partly sour from want

of proper care in keeping clean and sweet, pails, strainers, or any vessel in which the said milk is kept, shall for every offence forfeit and pay a sum not less than \$1 nor more than \$50 and costs, in the discretion of the Justices before whom the case is heard. Provided, however, that this shall not prevent the sale of skimmed milk by any person if the fact that the same is skimmed is made known to the person to whom such milk is being sold."

MILK FOR MANUFACTURING PURPOSES.

In the matter of milk for manufacturing purposes, the provincial law is found to be much more complete and concise than that governing milk for human consumption. It is included in two Acts, one of which was enacted in the session of 1909, (9 Edw. VII., ch. 86), and the other, enacted in 1908, (8 Edw. VII., ch. 55), was amended in 1909.

The new Act, "The Dairy Products Act," provided for the registration of all creameries with the Department of Agriculture before the first of January, 1910. After January 1st, 1910, no person shall carry on the business of a creamery without permission from the Minister of Agriculture, which permission shall only be granted after a report has been signed by an inspector. Permission may be refused for lack of proper equipment or unsanitary conditions. In addition, after January, 1911, no person may officiate as chief maker in any creamery or cheese factory without a certificate from the Dairy School of the Ontario Agricultural College or from the Eastern Dairy School or a special permit from the Minister of Agriculture on the grounds of experience and competency.

The main Act dealing with milk for manufacturing purposes is entitled "The Milk, Cheese and Butter Act." The first two clauses are:

"The owners or board of management of any creamery in the Province of Ontario may make such rules and regulations as may be advisable for the due carrying on of the business of the creamery."

"The patrons of all creameries may be required to subscribe their names to such rules and regulations, and the rules and regulations shall be binding on the patrons, owners and board of management who have so subscribed."

Formerly, section 2 provided a standard of 3.75 butter fat and 13 per cent. total solids, but this was repealed in the session of 1909, (9 Edward VII., ch. 26, sec. 24). Instead, it is provided that the owner or manager of a cheese factory who suspects milk as being adulterated may enter upon or appoint some person to enter upon, the premises of the person supplying the milk and take samples direct from the cow supposed to have given the milk. The adulteration can thereby be detected, and it is provided (sec. 16, sub-sec. 2) that it shall be "sufficient *prima facie* evidence to show that such person by himself or his agent supplied milk substantially below the standard actually drawn."

The Minister of Agriculture, pursuant to the terms of sec. 13 of said Act, may appoint dairy inspectors who shall have "free access and admission to all cheese factories and creameries and the premises upon which milk or cream is offered for sale located within the Province and to all lands adjoining the same, and to the premises of all persons supplying milk or cream to any cheese factory or creamery, or for sale in cities, towns or incorporated villages; they shall also be empowered to take and test samples of milk found in cheese factories or creameries or in the possession of milk dealers having the same for sale in cities, towns or incorporated villages, or in transit between producers and cheese factories and creameries, between producers and dealers or between dealers and consumers in cities, towns or

incorporated villages; and they shall have the right to take and test samples of milk found upon the premises of producers supplying milk to cheese factories or creameries or for sale in cities, towns or incorporated villages, and may take and test samples from cows which have been producing milk to be sold to cheese factories or creameries or to be delivered for sale in cities, towns or incorporated villages, and any person refusing admission to the same or offering obstruction to the work of inspection or the taking of samples or testing of same shall be subject to the penalties provided in section 16."

Under this Act thirty-five instructors are employed to visit the cheese factories and creameries and to some extent the sources from which the supply to these institutions come.

WHAT MUNICIPALITIES MAY DO.

Under and by virtue of these powers and limitations, it devolves on municipalities to make and administer by-laws in reference to milk. To see what by-laws were enacted under the Provincial Statutes and how they were administered, your Commission visited every city in the Province and a few of the larger towns. It was felt that the Medical Health Officers upon whom has rested the responsibility of administering the by-laws, would be in a position to speak with the authority of experience as to their effectiveness or the need of changes. Accordingly, a letter was addressed to each Health Officer asking questions on a number of points, including the following:

"What provincial or municipal legislation do you think is needed?

"Do you think a standard of butter fat and total solids is practical and desirable and if so what standard would you suggest?

"What are your views on pasteurization?

"Has the tuberculin test ever been attempted in your district or do you think tuberculosis is very prevalent among dairy cattle?

"What do you think is the best plan to get a clean raw milk supply at moderate cost?"

The answers are herein given as far as received.

TORONTO.

In the handling of a milk supply the difficulties increase with population, because the supply must be brought from a greater distance and the problems of transportation and keeping are greatly enhanced. Toronto, with a population of upwards of 350,000, nearly four times larger than the next largest city in the Province, faces the problem in its most acute form. Exclusive of West Toronto and other recently annexed districts, the city consumes 2,336 eight gallon cans a day, coming from approximately 900 farms within a radius not exceeding forty miles.

Over one-third of this is supplied by three firms, but the balance passes through the hands of two hundred retailers. The milk is brought to the city by steam railway, by electric railway, and by wagon, and from 24 to 36 hours elapse between milking and consumption.

Toronto's milk by-law provides for the licensing and inspection of all "cows, cow byres, dairies or other places in which milk is sold or kept for sale," stipulates cleanliness and sanitation, and provides that "milk shall not contain any matter or thing liable to cause disease, either by reason of adulteration, contamination

with sewage, absorption of disease germs, infection of cows or any other generally recognized cause." Cans, bottles or other vessels used for milk must be thoroughly washed before using and kept dust-proof when in use. An inspector is employed to enforce the terms of this by-law within the city and hence in its practical working out it applies only to distributing plants and retail shops. These are visited at varying intervals. If they are found in a moderate state of cleanliness, they are reported as "fair," while if they are in a good state, they are reported as "perfectly satisfactory." Those with a reputation of being clean are inspected not more than three times a year; those found very bad are visited frequently until they improve. This is the extent of the inspection and there is no supervision over conditions on the farm. A few years ago the Health Officer dumped milk which he believed to be contaminated into the ditch. A lawsuit followed, but it was settled out of court. No further attempt was made to exercise any authority outside the city limits.

SOME STARTLING FIGURES.

Numerous samples are taken each week and submitted to the City Analyst for food value analysis. In addition, during the past summer between 300 and 400 samples were examined for preservatives and in none was formaldehyde or other preservative found. A different story, however, is told by the food value tests. Dr. Sheard, Medical Health Officer, showed your Commission the record of these tests and some astounding figures were revealed. Whereas three per cent. of butter fat and twelve per cent. of solids are considered as a reasonably moderate standard, some samples went as low as 1.91 per cent. of butter fat and 9.07 per cent. of total solids. That it is not a matter of a few isolated cases is shown by the fact that of 2,541 samples tested up to October 29th, 1,014, or about forty per cent., were below three per cent. The deductions from these figures of the City Analyst are confirmed by examinations of the Dominion Analyst, who tested samples from all parts of Canada and found the milk from Toronto district the poorest in quality. The following figures picked at random give an idea of Toronto's daily milk supply:

Date.	Total Solids.	Butter Fat.
January 14.....	11.52	3.36
January 18.....	11.92	2.98
January 29.....	11.37	2.71
February 1.....	11.00	2.60
February 8.....	11.64	3.27
July 27.....	13.05	4.03
May 7.....	11.64	3.10
May 29.....	11.12	2.90
May 28.....	12.19	3.48
June 11.....	11.44	2.69
June 12.....	11.50	2.85
June 19.....	12.03	3.40
September 4.....	11.22	2.90
September 30.....	12.22	3.20
June 12.....	11.47	3.28
October 2.....	12.45	4.00
October 9.....	12.04	3.50

This reveals a condition of affairs probably unparalleled in any city on the continent and certainly, as subsequent figures show, unparalleled in any city in Ontario. Various explanations are offered. One is that the poorer cows of the Province, cast off subsequent to an unprofitable season, are picked up cheaply on the Toronto market. Another is, that there are many cows in this district of types which are noted for producing large quantities rather than milk rich in food values. Another is, that the dealers get the city to test samples suspected of being low, in order to follow them up, and that therefore the percentage does not represent a fair ratio of the whole supply. Any or all of these explanations may account for some proportion, but it is hardly credible that all combined could explain such a large percentage. A herd may at times give milk below three per cent., but this is rare, and to say that forty per cent. of the milk of this district is below three per cent. when it is drawn is a libel on the cow. The serious conclusion cannot be evaded that there is somewhere adulteration, by the addition of water or the extraction of cream, to an alarming degree.

To meet this condition, Dr. Sheard said: "In my opinion the two chief requirements in connection with the milk conditions of this Province are, first, to clearly define what good milk is presumed to be, and when the same is adulterated, and to make it an offence against law to sell such adulterated milk. In this respect I think the code of New York covers the point admirably. In addition I think the Health Officer should have the right to go into outside municipalities from which milk is being delivered into the municipality over which he has supervision to inspect all dairies, dairy premises and dairy cattle, and if anything unsanitary is found thereon, or any diseased cattle, or any contagious disease is found to exist amongst the employees and milkers, he should have the right to prevent such milk from coming into the municipality over which he has jurisdiction, and if the milk be sent in, to seize and carry away the same, and have such shipper punished by a fine. Furthermore, all shippers and transporters of milk, whether by team or car, should provide such receptacles, properly equipped with ice or otherwise as will maintain the milk during transit at a temperature below 50 degrees F."

INADEQUATE COOLING IN SUMMER TRANSPORTATION.

In company with Dr. Sheard, your Commission spent considerable time visiting various milk distributing plants and retail stores in the city, noting the method of handling the milk and the equipment. Milk drawn from the cow the same morning and the night previous arrives at the city plants usually between ten o'clock and noon. It is, of course, in the extreme summer weather when the greatest difficulty is experienced in handling. Shaken up in the cans on railroad and wagon road, the milk arrives in the city at a temperature of from 60 to 70 degrees F., which constitutes an excellent medium for the development of bacteria. Some of the milk tested by your Commission on an August day actually showed a temperature of 72 to 74 degrees, while very few went below 60. With the exception of a cover which is usually over the wagon, no attempt is made to keep the milk cool during transportation. Arrived at the plant, it is immediately passed over the pasteurizer and clarifier in the large establishments so equipped, and, in almost all, over the cooler and into the bottles. The bottles are then placed in an ice vat or a refrigerator until they are delivered the next morning. The milk therefore reaches the consumer from 24 to 36 hours after it leaves the cow.

It is not within our scope of duty to enter into any detailed description of the equipment of the respective dairies. In the great majority of cases the dairies were equipped with cooling tanks, bottling machines and bottle sterilizing facilities, but it is to be remembered that the test of the efficiency of all these appliances is the eternal vigilance and thoroughness with which they are operated from day to day. Bottles may be either the best or worst method of handling milk and all previous care and caution has been for naught if the bottles are slovenly or imperfectly sterilized. The cans are also sterilized in the city before being sent back to the farm.

In the matter of cleanliness the majority appeared to be making an honest effort to maintain a fair standard. This was especially true in some of the smaller dairies. There were others, however, both large and small, at which too little attention was paid to these matters. At many the basement was found to be utilized for bottle filling, bottle sterilizing and storing. To this in itself little objection can be found provided the room is used for no other purpose. In one place it was noticed a corner was used for coal, another corner for miscellaneous, while, unsheltered from the dust and dirt, human food was being prepared at the other end. This cannot be too strongly condemned.

All these matters have been under civic supervision and there were many obvious proofs that periodical inspection had a salutary influence on maintaining cleanliness and care.

COMMERCIAL PASTEURIZATION.

When we made our visits in August, it was found, as nearly as could be estimated, that about forty to fifty per cent. of the milk supply was being "pasteurized" and all by the process known as "commercial pasteurization." One large company was then installing a machine to do pasteurization in accordance with more modern and scientific standards, and we learn another company has also adopted this method, so that there are now at least two firms equipped to supply scientifically pasteurized milk. In August, however, almost all the larger dairies were heating their milk to from 150 to 165 degrees for from 20 to 30 seconds, chilling, and then sending it out labelled "pasteurized." In most places the milk was run over a circular coil, but in at least one instance it was heated in an oblong tank with open top, revealing a number of flies floating around, to the danger of which the dealer was apparently oblivious. Many dealers were asked the question "Why do you pasteurize?" Invariably the answer came, "Well, it keeps the milk from souring so quickly; if we did not pasteurize, much of our milk would go bad." One bright, up-to-date dealer said, "Well, you see the doctors are making such a row about milk now and they say it kills the disease germs." In many cases pasteurization has been carried on for eight or nine years and there is little doubt but that it was inaugurated and maintained to prevent the souring of the milk, for which "commercial pasteurization" was specially fitted, in that it destroyed the lactic acid producing germs which sour the milk. Among the smaller dealers there was a practical unanimity against pasteurization. They said they had no difficulty in keeping their milk sweet even in hot weather. They declared themselves opposed to pasteurization on the ground that it would discourage cleanliness on the farm.

"BULK" MILK AT THE CORNER STORE.

The great percentage of milk used in the city is delivered to the door of the consumer in bottles conveyed in covered wagons, except in the case of hotels, restaurants and such large customers, who are supplied in cans. In addition, however, milk is offered for sale in "bulk" at many stores. One such store visited was neat and clean and sold only dairy products—milk, cream, butter, etc. Such stores are exceptions and as a rule the milk is sold along with groceries, vegetables, fruit, fish and all articles usually dispensed in a general purpose store. These stores are located in such congested districts as "the Ward" and in the outskirts as well. In many cases an effort is made to keep the milk pail in a separate compartment of a more or less cool refrigerator, but in others even this precaution was lacking. The milk is dipped out in small quantities of pints and half pints and carried away very frequently in open vessels. It can easily be seen that especially in the hot weather this system may be a grave menace to health. Each time the dipper goes into the pail, it is almost inevitable that it must carry contamination from the odors and dust of the surrounding atmosphere, and it is not surprising that the bacteria count of such milk invariably runs into the millions. Enquiry among the dealers elicited the fact that the milk is kept for sale in small quantities not so much because of profit as because of convenience to customers. People came in to buy milk and remained to buy something else. The housewife who ran short of milk in the evening, the extremely poor who could not afford to buy in large quantities, alike found the corner grocery milk supply a convenience, and in appreciation of this, or because of lack of knowledge, they were prepared to take the risk and incidentally feed it to their infants. At the same time several expressed a willingness to stop selling entirely if the prohibition was general.

VIEWS OF RETAIL MILK DEALERS.

An important factor in the milk question in Toronto is the retail milk dealers. With very rare exceptions, they are not producers, but equally with the producers they are the custodians of the health of the citizens in as far as that health may be affected by the milk supply. Like the producer also, they have a large amount of capital invested and are vitally concerned in the proper carrying on of the business. Realizing that their experience would be of value, we took advantage of every opportunity offered to acquaint ourselves with their side of the question. In addition to discussing the matter informally with the proprietors and others at many of the places visited, we conferred with the representatives of the Milk Dealers' Section of the Retail Merchants' Association. The Committee was composed as follows:—R. W. Dockeray, Chairman; A. Anderson, R. H. Pill, J. B. Dunlop, J. H. Lock and E. M. Trowern, Secretary. The questions of inspection, standard, selling only in bottles in shops, pasteurization and other points were discussed, and the Committee later formally set down its views as follows:

"How would you suggest that a proper system of inspection should be carried out and improvements made thereby?

"We would suggest that each producer be licensed in the municipality to which he sends the milk, for the purpose of keeping track of them, and that said license be granted after an inspection has been made and a permit issued by the Medical Health Officer of the municipality to which the milk is consigned, and if you deem it advisable to place any more reasonable restrictions on the retail distributors' premises, we offer no objection. The first step, however, is to see that the milk

comes from a clean and sanitary source, and then follow it up by imposing the same restrictions on the retail distributors.

"What would be a reasonable standard, and how would you enforce it?"

"We do not think it practicable to make any standard other than what nature determines, and we therefore suggest that all milk should be sold as taken from clean, healthy cows, without adding anything to it or taking anything from it.

"What would you suggest with regard to the selling of milk only in bottles in stores which also sell groceries and other mixed merchandise?"

"In our opinion all milk sold or exposed for sale should be kept in clean vessels on clean premises, and this should be left under the jurisdiction of the Medical Health Officer.

"What are your views regarding the pasteurization of milk?"

"It is our opinion that if the source of supply and the handling of milk is properly looked after, pasteurization is unnecessary.

"Have you any suggestions to make as to any improvements in the method of handling milk from the cow to consumer?"

"We consider that all milk that is sent to the retail distributor from the producer should be sent in sealed cans, and that all milk coming by rail should be shipped in refrigerator cars, and that all milk coming by wagon should be covered."

MILK SUPPLY FOR HOSPITALS.

In all large cities there are large public institutions which get their milk supply direct from the producer, without having it pass through the usual channels of distribution. Such an institution is the Toronto General Hospital, and we beg to refer to the experience of this institution inasmuch as it may have an application to the larger question of the general supply. The General Hospital uses one hundred gallons a day and pays seventeen cents a gallon. Early in the summer of 1908, Dr. J. N. E. Brown, the Superintendent, began to pay special attention to the purity of the supply. In a statement to your Commission, Dr. Brown said: "I had bacteriological tests made in the laboratory and found the count in some instances went to four or five million per cc. in the warm weather. I immediately made inquiries and investigated the source of supply. I found a barn of the average type and suggested some improvements in the sanitary arrangements and in the methods of handling, most of which were carried out without adding greatly to the expense or trouble. The result was shown in the bacteria count. Instead of finding millions per cc., the count came down to 600,000 in the hot weather and 60,000 in the cooler months. These figures, although still leaving room for improvement, show marked progress as the result of a little attention. A special supply is furnished for infants, being transported from the farm in ice-cold containers.

"In addition, I proceeded to ascertain whether hospitals in other large cities were devoting any special attention to the milk supply, and wrote letters to the superintendents of the leading hospitals in American cities. From Cincinnati, I learned that the Milk Commission of the Academy of Medicine there had conducted an enquiry into the milk supply of all the hospitals and had found it far from satisfactory. As a result all the hospitals are now supplied with 'inspected' or 'certified' milk and the Milk Commission believes no part of its educational campaign has brought better results than the bringing before the profession a review of the milk supply of the city hospitals.' From Providence, I learned that the

Rhode Island State law requires extra precautions in the milk supply of institutions, and in addition to this, all the milk of the Rhode Island Hospital has been pasteurized for some years with very satisfactory results. From New York, I learned that the municipal hospitals paid about fifty per cent. above the market price and secured milk of a higher grade. They let the contract by tender and asked for tenders for two classes (1) milk containing 4 per cent. of fat and 12½ per cent. of solids at least, and not more than 100,000 bacteria per cc. in May, June, July and August, nor more than 60,000 the balance of the year; (2) milk certified by the Milk Commission. Another New York hospital superintendent who got the regular supply said, "We have a regular bacteriological examination of our milk. I am obliged to confess it is generally somewhat above the limit set by the Board of Health as to the number of bacterial colonies but we all thrive on it." In a couple of cases no special attention was paid to the matter, while one reported they were supplied by their own herd."

MEDICAL MILK COMMISSIONS AND "CERTIFIED" MILK.

As the Medical Milk Commission has had considerable influence in directing attention to the necessity for safeguards in connection with the milk supply, it is fitting that the history, nature and aims of this movement should be herein recorded.

The Medical Milk Commission and "certified" milk movement began in Newark, New Jersey, in 1892. To Dr. Henry L. Coit of that city belongs the credit of originating the idea. He formulated a plan by which an organization of doctors should give their practical support and endorsement to any dairyman who would produce and handle milk in accordance with their regulations. These regulations were drawn up in such a manner as to insure the absolute purity of the milk. Dr. Coit succeeded in securing the co-operation of other members of his profession, and, in 1893, the Medical Society of Essex County, N.J., organized a Milk Commission and the work of securing certified milk was begun. Dr. Coit himself says the idea had its inception in his efforts to solve the problem of infant feeding and that this, together with the general need of pure milk for invalids, has been the chief factor in sustaining public interest. That interest has been not only sustained but increased, as is shown by the fact that there are now fifty-six Medical Milk Commissions in almost as many cities in the United States, and the movement has spread to Canada.

At the Convention of the Canadian Medical Association held in Ottawa in June, 1908, Dr. C. J. O. Hastings of Toronto read a paper on "The National Importance of Pure Milk." The matter was promptly taken up by the Executive, which decided to form a Canadian Medical Association Milk Commission. It was composed of representatives from all parts of Canada, with Dr. Hastings as Chairman and Dr. J. H. Elliott of Toronto as Secretary. Its object was defined as being to co-operate with Boards of Health in securing a pure milk supply, and to seek more stringent legislation. The meetings are held in Toronto, where enough members to make a quorum reside. They have adopted the following definitions:

"Certified milk is milk examined and guaranteed by any local Board of Health or incorporated society or association of legally qualified medical practitioners; first to be taken from cows semi-annually subjected to the tuberculin test and found without reaction, all doubtful and suspicious cases to be excluded from the herd; second, to contain not more than 10,000 bacteria per cc. in the summer and

5,000 in winter on delivery to the consumer; third, to be free from pus, blood, disease-producing germs, preservatives or other foreign matter, and not to have been heated in any way or frozen; it shall contain at least 12 per cent. of total solids, of which from 3 1-2 to 4 1-2 must be butter fat; it must be cooled to a temperature of 45 degrees within one-half hour after milking, and shall be kept at a temperature not higher than 45 degrees until delivered to the consumer.

"Pasteurized milk is milk which has been subjected in a closed vessel to a temperature of 150 degrees F. for twenty minutes or 140 to 145 degrees for thirty minutes and immediately thereafter refrigerated to at least 45 degrees and kept at that temperature until delivered to the consumer."

To attain the conditions of certified milk, very scrupulous care is necessary and this means considerable extra labor. Then the cost of the tuberculin testing must be borne by the dairyman. To see that those conditions are observed, a doctor visits the dairy once a month. In view of the heavy extra expense, the price of the milk has to be materially advanced, and certified milk in Ontario sells for fifteen cents a quart. While it is a great advantage that certified milk should be available to those who can afford it—and a very large number can afford it for infant feeding and invalids at least—still it will probably never constitute any large percentage of the general milk supply. A mistake is sometimes made by taking it for granted that because a firm produces certified milk, therefore all the milk sold by the firm is produced under the same conditions. The difference in the price in itself ought to prevent any misapprehension on this point.

The Canadian Medical Milk Commission are now organizing local Commissions in every city in Canada. In Ontario thus far Commissions have been formed in Toronto, Ottawa and Hamilton.

The Toronto body, known as the Milk Commission of the Academy of Medicine, was organized in October, 1908, with the following members: Dr. Henry T. Machell, Chairman; Dr. W. L. T. Addison, Dr. John A. Amyot, Dr. Allen Baines, Dr. C. J. O. Hastings, Dr. Alex. McPhedran. They have a bacteriologist and chemist and veterinarian and the laboratory of the Provincial Board of Health has been placed at their disposal, hence no charge is made for bacteriological tests. The cost of the veterinarian, printing and other incidental expenses are paid by the dairymen. The first certificate was issued to Price & Sons in February, 1909, but since that time the production of certified milk has been undertaken and carried on by the Manor Farm Dairy, and the Dentonia Farm Dairy, controlled by the City Dairy Company. At each the milkers wear white suits and the milk is removed from the stable as soon as drawn from the cows. One of the secrets of the low bacteria count is the fact that the milk is chilled and bottled within five or ten minutes after being drawn. A certificate is issued each month. Certificates are now also being issued for milk pasteurized in accordance with the standard set forth above. Another condition imposed is that all the cans must be sterilized in the city and sealed before being shipped to the farm and again sealed on the return, to prevent any contamination in transit. In both cases it is of course entirely a matter of voluntary arrangement between the Commission and the company.

To your Commission, Dr. Hastings, Chairman of the Dominion Commission, voiced the views of the Commission as follows:

"The consensus of opinion of the most eminent authorities on the continent of America is that pasteurization such as we recommend will destroy all disease-producing germs and does not interfere with the digestibility or food value of the milk. From our investigations we can fully endorse this statement and recom-

mend the following classification: first, certified milk; second, inspected pasteurized milk. We strongly advise in the interests of public health that all milk not answering the standard set for certified milk be pasteurized and that all milk before being accepted as fit for pasteurization must be at least macroscopically clean and kept at the lowest possible temperature, and also that the shortest possible time elapse from the taking of the milk from the cow until it is pasteurized and that immediately after pasteurization the milk be lowered to a temperature of 40 degrees and maintained at that until used, all pasteurization to be under the control of the Health Department. We also recommend that as soon as possible the entire source of supply of the Dominion be placed under rigid inspection of the various health departments or Medical Milk Commissions, from producer to consumer—such inspection at least as will secure clean milk.”

OTTAWA.

About two years ago as a result of a public agitation, aided materially by the newspapers, the City of Ottawa municipal authorities undertook the improvement of its general milk supply. On the 4th of May, 1908, a by-law was passed which stands to-day as perhaps the most complete and effective by-law of any Ontario city. The outstanding features are the licensing of both the retail dealer and the dairyman on the farm, and the appointment of a veterinarian to make regular inspections on the farms as well as in the city.

The by-law begins with a clause to the effect that no persons shall sell milk either directly to the consumer or in wholesale quantities to stores or to any person to be afterwards sold without first obtaining a license at a cost of one dollar. This it will be observed covers restaurants. Before applying for a license, the applicant must fill in the following form:

“Desiring to sell milk in the City of Ottawa, I hereby apply to have my cattle, premises and equipment inspected, and agree to observe the provisions of The Public Health Act and all by-laws of the Corporation of the City of Ottawa and all regulations of the Board of Health of the said City relating to the production and sale of milk, and to keep my cattle and premises and to handle my milk in a manner satisfactory to yourself; neglect or default in this respect rendering me liable to forfeit my license.

“My milk is obtained from my own herd, consisting of.....
cows, from which the average quantity sold is.....gallons, and from
.....

“The food supplied
....., 19....”

Upon the cattle, premises and equipment being found satisfactory on inspection, the license is granted. It is specifically provided that all dairy farms as well as distributing plants shall be open to regular inspection; that all stables shall be thoroughly lighted, ventilated and drained, the walls and ceilings white-washed twice a year and kept free from dust and cobwebs and manure; that the milk be removed from the stables as soon as drawn; and that the dairyman must notify the Health Department of any contagious disease among the animals or among his family. A minimum standard of 12 per cent. solids and 3 per cent. butter fat is included.

The administration of this by-law has been in charge of Dr. Robert Law, Medical Health Officer, and Dr. Hollingsworth, Chief Food Inspector and Veterinarian, and from what we were able to see the by-law is being well administered with splendid results.

About six thousand gallons are consumed daily in the city, coming from 140 farms within a radius of 10 miles. The milk is sold for six cents a quart in summer and eight cents in winter, a small quantity of certified milk being sold at ten cents a quart. Thus far the demand for this has been so small that it is sold at a financial loss. Over sixty per cent. of the Ottawa milk supply is handled by one firm, which has a large, modern, well equipped distributing plant. Maintaining a veterinarian and doing inspection of its own, it has been an important factor in improving conditions. Last year it installed a pasteurizing plant with a holding device, so that since that time all the milk has been pasteurized at about 147 degree F. for thirty minutes.

The Department of Health is equipped with a laboratory wherein bacteriological counts as well as quantitative analyses are made. During 1908, of 411 samples examined, an average of 150,000 bacteria per cc. was found. During the first ten months of 1909, over 1,300 samples were examined for quantitative standard, and only 36 were found deficient in butter fat, the average being well over three per cent. Of 400 samples from June to October, the average butter fat was 4.2 and total solids 13.10. The following are a few figures:—

Date.	Butter fat.	Total solids.
1909.		
June 15.....	3.6	12.45
May 28.....	3.6	12.37
“ 28.....	3.3	12.01
“ 28.....	3.9	12.98
April 30.....	4	12.74
“ 23.....	3.8	12.69
June 24.....	4.5	13.07
“ 25.....	4.4	13.65
September 22.....	4.6	13.81
“ 22.....	4.2	13.33
“ 29.....	3.4	12.52
“ 29.....	3.6	12.60
October 11.....	3.4	12.46

But the feature in connection with the Ottawa supply is the condition of the herds and the stabling, to which reference is made in another page.

In answer to questions, Dr. Law expressed the following views on the milk question:

“A minimum standard of butter fat is practical and necessary and should not be lower than 3 per cent. butter fat and 12 per cent. total solids.

“Pasteurization under present conditions offers one of the readiest methods of securing a safe milk supply. In the absence of proper means on a large scale, household pasteurization can be carried out.

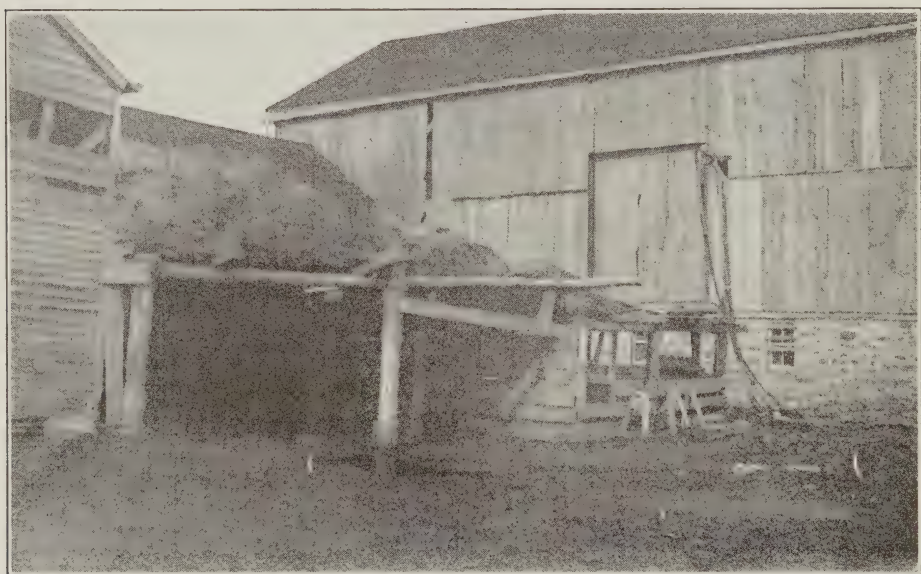
“Has the tuberculin test been tried here? Yes, in five herds; and especially in a large herd of registered Jerseys the number reacting was large.

“As to the general prevalence of tuberculosis, I am unable to give a definite opinion.

"To get a clean raw supply at moderate cost we must first have definite power to insure healthy tested cattle, definite regulations as to their care and the proper handling of the milk, and inspectors to inspect and instruct the dairymen in the handling of milk, also proper laboratories under trained men for the proper testing of milk."

HAMILTON.

In Hamilton, the third largest city in the Province, the milk by-law deals with the matter of licensing and inspection. No regular system of inspection of farms has been attempted. The city uses about 3,500 gallons per day and pays six and seven cents per quart. All the supply comes from within a radius of ten miles and a very considerable portion of it has been pasteurized by the continuous



Some Ontario people are drinking milk produced in surroundings like this.

process by two distributing firms in the city. Periodical quantitative tests are made by the local inspector, but at no stated intervals, and the most recent we could secure were made in February last. They showed an average of 3.65 butter fat. The efforts made during the past summer to furnish a special supply for infants are related in another chapter.

Dr. J. A. Roberts, Health Officer, expressed the following views in answer to questions:—

"What provincial or municipal legislation do you think is needed?

"Provincial legislation enabling the supply to be thoroughly inspected by Local Boards of Health at its source and power to compel the adoption of such hygienic measures in the handling of milk as are generally recognized by competent authorities to insure a minimum contamination. Power should be given local Boards to enforce conditions around byres and yards, sufficient air space, ventilation, etc.,

Ordinances such as those relating to the temperature at which milk shall be brought into the city might be left to local authorities.

"Do you think a standard of butter fat and total solids is practical and desirable, and if so, what standard would you suggest?

"Yes. 12 per cent. solids, 3 per cent. fat minimum.

"What are your views on pasteurization?

"So-called 'commercial pasteurization' is a delusion and a snare calculated to make milkmen, if possible, more careless than they are at present. Aptly characterized 'a truce with dirt.' Pasteurization carried out so as to impair the digestibility of milk to a minimum degree would have the effect of destroying pathogenic bacteria but does not lessen the demand for care in producing milk. In large cities it might be of great service in control of milk-borne disease where it is difficult to maintain a sufficient staff of inspectors, but does not preclude the necessity of efficiently sterilizing all bottles, utensils, containers, etc., nor the most careful handling subsequent to pasteurization.

"Has the tuberculin test ever been attempted in your district or do you think tuberculosis is very prevalent among dairy cattle?

"No. Yes, but its importance may be exaggerated.

"What do you think is the best plan to get a clean raw milk supply at moderate cost?

"(a). The protection of the milk from infection by scarlet fever, diphtheria, typhoid and tuberculosis.

"(b). Cooling the milk and keeping it cool or at least below 50 degrees in order to prevent the growth of the bacteria which contaminate milk in spite of the most careful precautions.

"(c). Keeping the utensils clean, because it is impossible to produce uninfected milk unless the vessels are comparatively sterile.

"(d). Keeping the milk tightly covered.

"(e). Keeping the cows as clean as possible.

"(f). Keeping the milker's hands and clothes clean.

"(g). Keeping the barns and surroundings in a wholesome and thoroughly sanitary manner."

LONDON.

For twenty years Dr. T. O. Hutchinson has been Medical Health Officer for London and has exercised supervision of dairies. Five years ago, however, when Hon. Adam Beck was Mayor, a special veterinary inspector, Dr. C. S. Tamlin, was appointed to make a regular inspection of the dairy farms. The Board of Health adopted a set of regulations setting a standard for cleanliness of premises and emphasizing the importance of sunlight and ventilation. The health and proper feeding of the cows and the sterilizing of cans were insisted upon. It was provided that all dairies should be arranged in three classes, "A," "B" and "C," each to indicate the degree of perfection in which the cows, stables, cans, wagons, etc., were kept. It was also provided that "Where premises are not clean, or cows unclean or unhealthy, or where cows drink from stagnant or impure pools; or where the percentage of butter fat of the milk is less than 3.25 per cent., the vendor shall not be entitled to a license, and if in possession of one it shall be cancelled. If there is evidence of the adulteration of milk, the vendor shall be prosecuted." This classification, to which has been added a class called "unfit," is made each year and published in the newspapers, and hence there is an incentive to make a good

showing, especially as practically all the city's supply comes direct from the farm to the consumer. Dr. Tamlin visits each dairy farm twice a year and sometimes more frequently. He looks over the herd as to general healthfulness, but does not attempt the tuberculin test. If a cow is obviously diseased, however, he has it disposed of. Thus during the year he inspects 2,500 cattle. Dr. Tamlin only devotes a portion of his time to the work and is remunerated at the rate of \$400 per year. The plan has now been in operation for five years and we found many indications that it was working satisfactorily. Practically all the milk used in the city is sold at six cents a quart and delivered from cans, few bottles being used.

Dr. Hutchinson expressed the following views:

"No person should be allowed to sell milk without a license from the Board of Health and the license revoked if unclean or adulterated. All milk should be sterilized or pasteurized. Strict enforcement of cleanliness is the best plan to get a clean raw milk supply at moderate cost."

BRANTFORD.

Brantford's milk by-law, passed in 1905, follows very closely the lines laid down by the provincial statutes. Every person vending milk must get a certificate from the local Board of Health of the municipality in which he resides, and upon presentation of this certificate and a one dollar fee the city must grant a license. Hence, the city's sanitary inspector inspects the premises, chiefly distributing plants, within the city limits, while the township inspector inspects the barns, and on the strength of this inspection the license is granted. Dr. Pearson, Medical Health Officer, stated that before the amendment of 1900, the city made inspections at the source of supply, and conditions were much better then than now.

Brantford's supply averages 4,438 quarts per day and comes from sixty-four dairies—a very large number for a city of Brantford's population. Another feature of the Brantford supply is that comparatively few farmers retail themselves, preferring to sell it wholesale to retailers in the city. Very little is delivered in bottles. Samples are taken on the street each month from the wagons, and tests made as to butter fat. The results are published in the press at intervals, and this method is considered more effective in keeping the average up to 3.5 than frequent court fines would be. A few years ago a very general use of formalin in the milk was discovered, but prompt steps were taken by the health authorities, and there has been no trouble since from this score. During the past summer the Board engaged A. B. Cutcliffe, V.S., to make a detailed inspection of the source of supply. He was accompanied by James Read, township inspector, and made a brief report on every stable visited, noting the ventilation, water supply, healthfulness, cleanliness, etc. He found that ventilation was general through stairways and openings to barns above and through silos, and he recommended that a liberal use of whitewash in the stables and the clipping of the hairs from the quarters and udders would greatly add to cleanliness in handling milk.

GUELPH.

On November 8th last, Guelph Council passed a new milk by-law following closely the authority given in the Public Health, Municipal and other Acts. It provides for the licensing of all who sell or supply milk for sale in the city, said license to be granted upon the production of a certificate signed by the Secretary of the local Board of Health in the municipality in which he resides. This comes

under Section 10 of the Health Act, while the inspection and suspension of the license comes under the Municipal Act of 1903, providing that there shall be no suspension without concurrence. To this by-law a schedule is attached providing a form to be signed by the dairyman as follows:—

Schedule "A."

Name
Address
Locality of source of milk
No. of cows
Quality of (to dairies
Milk (to private people
Food Supply

"In consideration of license being granted to me to sell milk in the City of Guelph, I hereby agree to report to the Medical Health Officer of the said city forthwith and at furthest within twenty-four hours any infectious disease that may occur in my family, or in my house or shop, or in any place from which such milk is obtained or taken for disposal, and also whatever disease may occur amongst my cattle.

"I also agree to allow the said Officer, or any Sanitary Inspector of the said City, to inspect at any time my cattle, my cow byres and dairies and premises whether same are within the City of Guelph or outside the City limits, and all places where milk is sold or kept for delivery or sale by me, and to furnish samples of milk to any said Officer or any Sanitary Inspector of said City whenever required to do so."

As to the nature of legislation needed, Dr. H. O. Howitt, Medical Health Officer, said: "Power to revoke a license should be vested solely in Board of Health. City Councils should have nothing to do with it as at present stipulated in the Statute books. Medical Health Officers, veterinary inspectors, or whoever is appointed for the purpose, should not have to deal with the Medical Health Officer where milk is obtained from—that is, the Medical Health Officer of a city or town should be sole judge as to condition of milk supply consumed in his city or town."

AT THE AGRICULTURAL COLLEGE.

A visit was paid to the Ontario Agricultural College, where every courtesy was extended by President G. C. Creelman, H. H. Dean, Professor of Dairying, and R. W. Wade, Assistant to Prof. Geo. E. Day, Professor of Animal Husbandry. A great deal of attention is devoted by the College to dairying, both in teaching and in the practical work of handling the herd. The cattle are all regularly tested with tuberculin and any reacting are thereafter kept apart in accordance with the Bang system of combating the disease. All the milk is pasteurized by the continuous process, a temperature of 185 deg. F. being reached, and the milk used for human consumption is subjected to 165 deg. F. Pasteurization was adopted as a result of Prof. Dean's visit to Denmark nine or ten years ago. It has been found specially valuable in butter-making, as, after pasteurization, a "starter" is added to give the butter the desired flavor.

The dairy barn has been in use now for some twenty years and it therefore falls far short of the modern idea of what a model dairy barn should be. This is especially true in regard to light and ventilation. By cleanliness, frequent lime-washing and prompt chilling of the milk, those in charge seek to make the best of their equipment and impress proper ideas of sanitation on the students. It seemed to your Commission, however, that a new dairy barn built on modern lines is very much needed by the College to keep up its reputation as one of the best agricultural institutions on the continent. It would, moreover, have an educational influence far beyond the attendance at the College. It is important that the College should lead in this as in other things.

While splendid assistance is being rendered to the dairy industry along many lines, we are of opinion that much more could be done in helping to combat disease in the herds. It is as important to know how to keep the cattle healthy as it is to know how to make good butter or cheese. As to whether a plan of veterinarian aid could be worked out in connection with the Agricultural College, the Veterinary College or the appointment of a provincial veterinarian, we are not prepared to say. We are convinced, however, that assistance along these lines would be of much value to the animal industry.

KINGSTON.

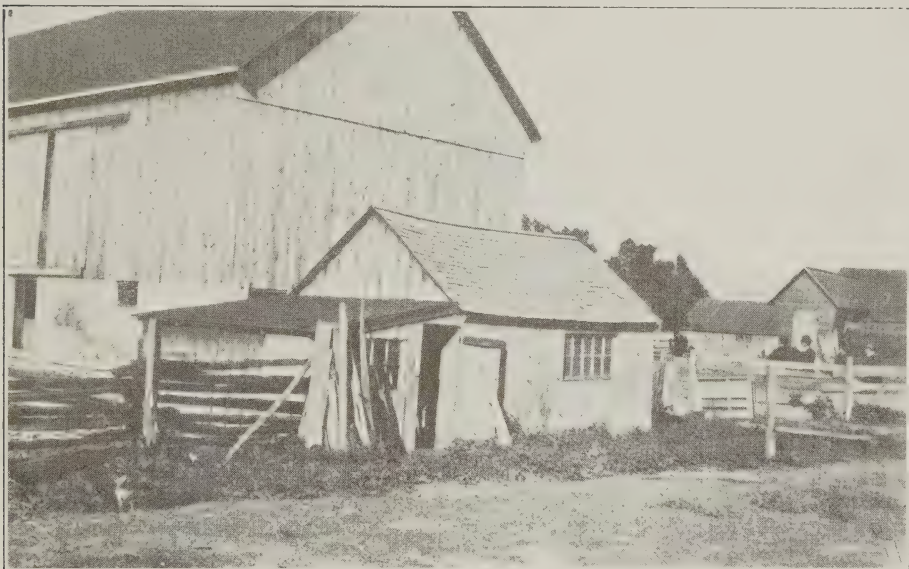
Annual inspections are made by the Sanitary Inspector and Medical Health Officer of the dairies supplying Kingston. Samples are also taken at intervals and tests made at the Dairy School as to the butter fat percentages. The city by-law calls for a standard of three per cent. butter fat and twelve per cent. solids. The following are tests:—

No.	Per cent. of Butter Fat.	Per cent. of total solids.
1	5.4	15.1
2	3.4	12.1
3	3.9	12.75
4	4.1	13.02
5	3.3	11.85
6	3.8	12.57
7	3.9	12.72
8	4.0	13.27
9	3.6	12.32
10	3.6	12.02
11	3.9	12.77
12	3.6	12.12
13	3.6	11.92
14	4.3	12.17
15	3.7	12.27
16	3.8	12.70
17	3.8	12.40
18	3.2	12.00

Average of butter fat, 3.82

Average of 24 samples of farmers' milk, 3.44.

Dr. John H. Bell, for many years Health Officer, although recently succeeded by Dr. A. R. Williamson, expressed the following views in answer to questions by your Commission in August last:



Pig pen near dairy stable is a menace to clean milk.



Neat and clean but badly ventilated and lighted.

"The present law relative to the inspection of dairies and the order for obtaining a license to vend milk is not very satisfactory. It appears that a license is issued on a report and recommendation of the Clerk of the Township and not from that of the Health Officer and Milk Inspector where the milk is vended. I, personally, think that the municipality in which the milk is vended should have full power to say what dairies are satisfactory and should receive a license, as they are the most interested. Of course, I know that at the present time they have an indirect method of having the license cancelled by a conference between the Health Officers of the municipality from which and to which the milk is distributed, with an appeal to the Provincial Health Department in case of a dispute, but that is too complicated to be practicable and never can result in obtaining a satisfactory milk supply from a sanitary standpoint. Again, I think that the Departmental Regulations should contain a code of rules governing the condition of the dairies and the handling of milk rather than having the local boards frame their own rules and without having any direct power to enforce the same under the existing law as the dairies are now responsible to the municipality in which they live and not responsible, only in an indirect manner, to the municipality to which the milk is vended."

STRATFORD.

Although Stratford has no by-laws governing the milk supply, the Medical Health Officer, Dr. J. A. Robertson, and the Sanitary Inspector, make an annual inspection of the twenty dairies supplying the city. They note the cleanliness and ventilation, character of the feed, healthfulness of the cows and nature of water used for drinking and washing cans. They also urge the necessity for personal cleanliness and care on the part of the milker and the wisdom of washing the udders of the cows.

All the dairies being located within a radius of five miles, the milk is delivered direct by the producer to the consumer. Bottles are but rarely used. Samples are taken on the street and the results are published, but the names are withheld. A June test showed the following figures:—

Per cent. of fat.	Per cent. solids not fat.	Per cent. total solids.
3.80½	8.70	12.50
3.40½	8.85	12.25
3.40½	8.60	12.00
3.40½	8.85	12.25
3.20½	8.80	12.00
3.20½	8.55	11.75
3.20½	9.05	12.25
3.20½	8.55	11.75
3.80½	8.45	12.25
4.00½	9.00	13.00
3.60½	8.90	12.50
3.20	8.80	12.00

In answer to questions, Dr. J. A. Robertson, Health Officer, said: "I think the standard should at least be three per cent. Re my views as to pasteurization: mothers do not pasteurize; anything contrary or conflicting with Nature proves a

failure. No tuberculin tests have been made. The cattle seem all perfectly healthy. There seems to be no sign of tuberculosis. We try to impress upon the vendors that they are responsible for the lives of hundreds of children."

ST. THOMAS.

With the exception of Ottawa, St. Thomas is the only city in Ontario making bacteriological tests of its milk supply. Last year the local Board of Health adopted a standard of 3.5 butter fat, 12 per cent total solids and 8.5 solids not fat. They also equipped a laboratory and appointed Mr. A. F. McLachlin analyst. Although the analyst was appointed chiefly to watch the water supply, Mr. McLachlin has devoted considerable attention to the matter of milk. The city has no system of regular or special inspection of the dairy farms, but W. J. Shaw, the city's energetic sanitary inspector, keeps a supervision in the city. The reports of the analyst, however, are published regularly in the papers and this is claimed to have a very salutary stimulating effect, and, moreover, the analyst occasionally goes out to the farms to make suggestions. In July the milk of one dealer showed 121,000 bacteria per cc. and the publication of this fact seriously affected the business of the dealer. He made some improvements, and in August the milk showed only 9,000. The following figures from recent tests tell their own story:—

No.	Fat.	Total solids.	Solids not fat.	Bacteria.
1.....	3.50	12.21	8.71	6,000
2.....	3.60	12.08	8.48	2,000
3.....	3.80	12.32	8.52	26,000
4.....	3.40	11.34	7.94	121,000
5.....	5.20	13.50	8.30	53,000
6.....	3.80	12.32	8.52	153,000
7.....	5.10	13.89	8.79	14,000

CHATHAM.

Two inspections are made each year by the sanitary inspector of the cattle and dairies supplying Chatham. All milk vendors must secure a license. Each month examinations are made of the milk for food value. The results of these analyses and of the inspections are published in the local daily papers. When cattle look badly run down, they are subjected to the tuberculin test. Two were so treated last year and both reacted and were destroyed. Dr. Wm. R. Hall, Health Officer, however, believes bovine tuberculosis rare in that district.

In answer to questions, Dr. Hall said: "We considered commercial pasteurization and the establishment of a municipal plant, but decided against it (1) because we believe a clean raw milk is better suited to the requirements of infants than is a pasteurized milk, and there is nothing gained by pasteurizing a clean milk; (2) because contaminated milk and milk that is unclean cannot be made fit for use by pasteurization, and the knowledge that it is to be pasteurized before use would in many cases lead to carelessness in its handling by the producer, and would materially interfere with our efforts to obtain improvements in the handling of milk by the producer; *American Medicine*, 1907, truly states 'pasteurization is a method which merely enables the dirty dairyman to keep his milk from souring

until it is sold'; (3) because pasteurizing milk does not destroy the spores or eggs of infecting bacilli, and they afterwards increase more rapidly in pasteurized than in raw milk because they are not, as in raw milk, inhibited by the action of the lactic acid ferments; pasteurized milk does not sour, but does become putrid."

"Producers of milk should be subject to the rules and regulations required by the municipality in which the milk is distributed for actual consumers and subject to prosecutions for non-compliance in that municipality, i.e., the municipality consuming the milk should not be required to go into the municipality producing the milk to punish an offender.

"I was a member of the Committee that framed regulations to govern milk dairies in the Province. When approved by the Provincial Board of Health they were recommended by the Board, but had no legal status. I would recommend that they be made legal requirements. In my personal opinion, the standard of milk is perhaps a little too high in the above-named recommendations. On several occasions I have tested milk taken directly from the cow's udder in my presence and found it as low as $3\frac{1}{2}$ per cent. butter fat and 12 per cent. solids.

"We have used the tuberculin test some. One year we used it on 22 cows and three reacted in one herd, all partly Jersey-bred cows. Since that we have used it six or eight times on suspicious-looking bad-conditioned cows, four being ordered out of the herd, the local Board of Health bearing the expense. I see no objection to the use of the test if properly done, but it takes time and experience to interpret results, and should be well paid for to insure good results. At a rough guess, after twenty-five years experience, I would place the percentage of tuberculous cattle in this district at about 5 per cent.

"As to how to get a clean raw milk supply at moderate cost, granting the production under all cleanly precautions and the rapid cooling necessary after milking, the great desideratum, getting the milk to the consumer without raising its temperature, is the hardest to deal with, when the cost has to be considered. At present I cannot make any recommendation, except that milk is still a cheap article of diet as compared with others and the price might be increased to attain the object."

WOODSTOCK.

Woodstock is fortunate in its milk supply in that it all comes from about a dozen farms in the immediate vicinity, and is, therefore, easily supervised. Many other cities not twice as large get their supply from four times as many places. Like London, their plan of supervision is by the semi-annual inspection of the farms, for which they pay \$25 per year. Dr. Rudd, who does the inspection, reports to the Board of Health, but the reports are not published in the papers. Only a small proportion of the milk is delivered in bottles. The city endeavors to maintain a butter fat standard of 3.5 and the average usually runs about 3.8.

Dr. McLay, who has been Medical Health Officer for twenty years, expressed the following views in answer to questions:

What provincial or municipal legislation do you think is needed?

Thorough inspection of herds, byres, water supply, etc., and better remuneration to medical health officers.

Do you think a standard of butter fat and total solids is practical and desirable, and if so, what standard would you suggest?

Yes. A mixed grade ought to give 3.5 butter fat and solids in proportion for domestic use.

What are your views on pasteurization?

I have had no experience.

Has the tuberculin test ever been attempted in your district, or do you think tuberculosis is very prevalent among dairy cattle?

May have been in isolated cases. I do not think it is very prevalent in this section.

What do you think is the best plan to get a clean raw milk supply at moderate cost?

Every municipality ought to appoint a competent veterinary surgeon to examine the herds, byres, approaches to byres, cooling houses and water supply at least twice during the year and report to the Board of Health his finding. Said report may be forwarded to Government authorities. I think if such a course was pursued, our larger cities would have a better supply of milk.

BELLEVILLE.

Publicity has been found a valuable agency in Belleville. The results of inspections and tests have been published in the local papers. The city consumes about 5,000 quarts per day, and pays from five to seven cents a quart. The milk is delivered by the farmer to the city vendor, who in turn delivers it to the consumer either in bottles or in bulk. No inspections are made outside the city. An effort is made to secure milk which will test 3.5 butter fat and any vendor selling milk below this standard is warned.

Dr. Horace A. Yeomans, Medical Health Officer, expressed the following views in answer to questions:

"We think the standard of butter fat and total solids should be insisted on and is desirable in the interests of the general public, as without these we have no convenient and practical means of determining the purity of the milk.

"The tuberculin test has never been employed in this district, and as far as our observation would go has not been required, as we have had little trouble with tubercular cattle.

"Our opinion is that the Ontario Legislature should enact such laws as would place it within the power of each municipality to insist on a proper and pure supply of milk, and to severely punish a vendor for supplying an impure article.

"Our experience has been that the carelessness in collecting the supply on the various farms is more to blame than in subsequent adulteration.

"We know that milkers do not prepare themselves in any way before milking the cows, and it is a common thing to see men moisten their hands by spitting on them before beginning to milk the cow. This, of course, must give rise to sources of infection and must produce nothing like a pure milk supply.

"As to pasteurization, we have never practically advocated this, as our milk supply reaches the city within a few hours after being taken from the cows."

PETERBOROUGH.

Aside from the making of tests to determine the contents of butter fat and total solids, little practical supervision has been exercised over the milk supply of Peterborough. Provision for taking samples for this purpose and for licensing under the terms of the Ontario Statutes are points dealt with in the by-law passed in 1906.

As to quality, out of 25 samples tested in November, two showed 3 per cent., two 3.2, and the balance from 3.4 to 4.4.

In reply to questions, Dr. A. W. McPherson, who was appointed Medical Health Officer a short time ago, said:

"There should be a standard for butter fat, 3 per cent. being the lowest, and there should be one for solids also.

"Pasteurization—if we can get clean milk, it is to be desired, but if that is impossible, pasteurize. However, I think that the more we advocate and adopt pasteurization, the less effort will be made toward cleanliness, and therefore it would be wiser to advocate legislation re cleanliness. I think the dairies should be inspected regularly and the dairyman taught the value of cleanliness and how to accomplish it."

WINDSOR.

Inspections of the dairies and farms are made by Dr. Ashbaugh, Medical Health Officer, by whom quantitative analyses are also made. These analyses show butter fat quality in the neighborhood of 3.5, samples below 3 being very rare. The business is very much divided up and the milk comes from between 50 and 60 sources, including a number of small dealers who keep one or two cows. Dr. Ashbaugh stated that he had frequently urged the appointment of a veterinarian as inspector, but the suggestion had not been acted upon.

NIAGARA FALLS.

Niagara Falls secures the 700 gallons used in the city each day from a radius of twelve miles and pays six cents in summer and seven in winter. T. E. Watson, V.S., is milk and dairy inspector for the city during a portion of his time. Butter fat tests are made at intervals and inspections are made outside the city, but not regularly. A few herds have been tested with tuberculin.

Dr. F. W. Wilson, Medical Health Officer, in answer to questions, said: "We make all dealers supply milk which has a minimum standard of 3 per cent. butter fat. We in this city are particularly in need of better legislation regarding more careful handling of milk and more stringent regulations as to quick delivery after its arrival in the city, higher standards of cleanliness of those handling milk, etc. I thoroughly approve of the tuberculin test being used on all cattle, and the pasteurization of all milk. I am particularly in favour of all milk being brought to one central depot where it shall daily be tested."

ST. CATHARINES.

Up to the past summer there was no by-law regulating the supply of milk for St. Catharines. Inspections were made, however, by Dr. F. King, Medical Health Officer, and samples taken and tested. Owing to the lack of authority, however, this inspection was ineffective, and in his last report Dr. King declared that of twenty-three dairy farms, none were perfect, seven were good, seven fair, four indifferent and five bad. In fact he said, "While on many of the dairy farms the handling of the milk is unobjectionable, on some it is simply filthy and on others an improvement is much to be desired." From the necessarily limited observation of your Commission, we are not inclined to disagree with this statement.

In June last, however, the City Council adopted the model by-law drawn up by the Provincial Board of Health some time ago. This by-law calls for a high standard of food value and sanitation. It provides for the following standards: 13 per cent. total solids, 3.75 butter fat, at least 1029 specific gravity, no more than 300,000 bacteria per cc. It instructs the sanitary inspector to visit dairy farms not less than once every two months and use the score card in making his inspections. Copies of this by-law, printed on large cards, have been posted in the dairy barns, but no progress has been made in enforcing it. The city is handicapped by being situated in one of the poorest dairy districts in the Province, the land being so valuable for fruit-raising purposes.

Butter fat tests are made periodically and published in the local papers together with the names of the milk vendors. In the July test it was found that seven out of twelve samples went below three per cent. When the next test was made, however, in September, the average had been raised so markedly that only two out of twenty-four touched three and the balance scored from 3.50 to 4.75. In November there were four samples below three, two from the same place, and a large number just above three.

On the question of future legislation, Dr. King expressed the following views: "Requiring efficient sanitary conditions to be observed on all farms and other premises furnishing milk for human consumption. The language of such legislation should be clear and definite—the cleanly keeping of the cows in suitable, well ventilated and lighted stables with properly constructed stalls, floors, gutters, drains, etc.; the cleanly handling of the milk by clean individuals using clean utensils; efficient inspections of the farms, premises, cattle, stables, food, water, and utensils; all health officers to be subject to a Governmental Department and free from municipal influence and interference; the adoption of a reasonable official standard for milk with necessary authority to destroy any milk falling below said standard when intended for human consumption; authority for municipalities to establish or assist municipal dairies; the licensing of milk vending to be placed in the hands of the health authorities of the municipality wherein the milk is offered for sale.

"I think an official standard is practical and desirable as regards butter fat, specific gravity, acidity, adulteration by preservatives, temperature at time of sale and bacterial count, viz., butter fat, not less than 3.75 specific gravity 1030, temperature not above 60 degrees F. at time of sale, and not to contain more than 300,000 bacteria per cc., acidity not to exceed .02.

"I think pasteurization is desirable under the present conditions of the milk supply—of the two evils it is probably the least. Improve the condition of the milk to the standard reached by the city of Rochester, N. Y., and pasteurization may not be necessary.

"The tuberculin test has never, to my knowledge, been attempted in this neighborhood. I do not think that tuberculosis is prevalent among dairy cattle here.

"As to the best method to secure a clean raw milk supply at moderate cost, that is a complex question. I think the best plan is to refer the subject to the members of the Ontario Government Milk Commission."

IN NORTHERN ONTARIO.

Fort William, Port Arthur, and Sault Ste. Marie were the points visited in Northern Ontario. In spite of the comparative sparseness of the rural population, we found dairying had made much progress as well as farming in general. Much interest was taken in the importance of a sanitary milk

supply, and at Sault Ste. Marie a model dairy was under contemplation. In the matter of municipal regulation, Fort William had had a by-law drafted and under consideration for over a year, but it had not been adopted. No regular inspections are made. At Port Arthur, Dr. Laurie, Medical Health Officer, devoted some attention to the milk supply and tests were made by Mr. Trenks, Milk and Meat Inspector. At Sault Ste. Marie a considerable portion of the supply is pasteurized by the continuous process. The town has a comprehensive by-law bearing date of January 27, 1908. It provides for the licensing of all vendors annually, said license to be granted on receipt of a certificate from a veterinary to the effect that the applicant's cows are in a healthy condition. On request of the local health authorities, the tuberculin test may be applied to any suspected animal. Requirements are also laid down to provide for ventilation and cleanliness both in the stables and milk houses. Milk must contain at least 3.3 butter fat. The regulations as to standard of milk to be sold applies to hotels, restaurants and boarding houses. The following clause concludes the regulations, the administration of which is under the direction of Dr. McCaig, Medical Health Officer:

"To the dairyman complying with the foregoing regulations absolutely, and who is further able to distribute the milk within 12 hours after milking, keeping it in refrigerators or in ice water until delivered to the consumer, the Board of Health will grant a special license or certificate stating that the milk so handled and preserved is in a safe condition for the feeding of infants deprived of their maternal nourishment."

Dr. R. J. Manion, Medical Health Officer for Fort William, submitted the following replies in answer to questions:

"The supply is fairly satisfactory but could be made more so by proper inspection and enforcement of a pure milk law. I think a standard of butter fat is desirable and I think 3.5 per cent. would be satisfactory. Where milk is doubtful I think pasteurization good but not necessarily where previous suggestions are carried out. The tuberculin test has not been used in this district. I think tuberculosis fairly prevalent among dairy cattle. I think that the best plan to get a clean raw milk supply at moderate cost is to have uniform laws in regard to milk standard and regular inspection by competent inspectors."

SOME OF THE LARGER TOWNS.

Of the larger towns, which are almost cities by virtue of population, though not by incorporation, visits were paid to Galt, Berlin, Brockville and Owen Sound.

All, it was found, make more or less regular tests of milk for butter fat. In Berlin no sample went below 3.4, while the average for the nine months of the year for each dealer ranged between 3.5 and 4.2. At Galt comparative tests were made of night and morning milk, with the following interesting results:

Morning.	Night.	Morning.	Night.
3.9	3.8	2.7	3.9
5.1	5.1	4.	4.
3.9	4.1	3.6	4.4
3.3	4.3	3.5	4.2
3.7	3.9	4.	3.

In Galt, Dr. Vardon, Medical Health Officer, makes no inspection of dairies, but inspections are made occasionally by the Chief of Police. In Berlin, regular

inspections are made by a veterinary surgeon. Brockville is one of the few places where the by-law includes a clause providing that no milk tickets may be used twice and that duplicates of tickets must be submitted to the Town Clerk. In Owen Sound, a modern, progressive by-law regulating and licensing milk vendors was passed on February 24th, 1908, and regular inspections are made by Dr. H. G. Murray, Medical Health Officer, and the Sanitary Inspector. This by-law provides that no license shall be issued until the form prescribed by the Board has been filled in. Upon application being made for license, an inspection is made by the town Board of Health of the premises which it is intended to use either as a distributing plant or dairy farm. No milk may be sold if it has been adulterated, if it has been kept at a temperature above fifty degrees, if it is produced from cows stabled under unhealthy conditions, or if it is produced from a farm where any contagious or communicable disease exists. Milk is to be considered adulterated if it contains more than 87.50 per cent. water, less than 12.5 total solids, or less than 3.5 butter fat. The premises and appurtenances thereto must be kept "clean and wholesome at all times." Buildings must be kept whitewashed and accumulations of dung removed twice daily and one hour before milking. Cows must be kept clean and the udders brushed, washed or wiped before milking, with a clean cloth. Milkers and those engaged in handling milk must observe strict cleanliness. Attention is also paid to feeding and sanitation.

From the standpoint of quality, the tests ranged from 3 to 4.25, the average being around 3.5.

Being perhaps the only thing of the kind in use in the Province, it is of interest to quote the form which must be filled out in order to secure a license to sell milk from a wagon:

To the Board of Health of the Town of Owen Sound:

The undersigned hereby applies for a license to sell milk in the Town of Owen Sound, and makes the following statement in accordance with the by-laws of the Corporation, approved February 24th, 1908.

(Replies to the following questions must be written in ink.)

1. Is milk produced on premises owned or controlled by you?
2. From whom is milk purchased and give address of each person?
3. Over what road and at what time does your milk arrive in the town?
4. Location of dairy?
5. Number of cows?
6. Breed of cows?
7. Are all in good health?
8. Have cows been tested by use of tuberculin?
9. How are cows fed?
10. How many hours per day are cows in pasture during summer season?
11. How is milk cooled before leaving your dairy or residence?
12. How are your bottles and utensils cleaned?
13. Have you read the By-laws and Rules for handling milk adopted by the Council and Board of Health?
14. In handling milk do you agree to conform to the By-laws and these Rules?

- 15. Do you so agree to provide your wagon with ice that the temperature of the milk shall not rise above 50 degrees?
- 16. If milk is sold from large containers, do you agree to keep same covered and in an ice-box at all times and to provide and use a long-handled dipper that the milk may be stirred from the bottom before each sale?

Every one of the above questions must be answered before a license will be issued.

Dated at Owen Sound

day of19

Signature

Address

On the form of application for license to sell milk from depot the following question is included:

“5. If milk is sold from large containers, do you agree to keep same covered and in an ice-box at all times, and to provide and use a long-handled dipper that the milk may be stirred from the bottom before each sale?”

This by-law is being enforced with excellent results.

CHAPTER III.

*Being a Brief Record of Conditions Found on Dairy Farms,
Showing the need for a much Higher Average.*

In visiting the cities and towns in all parts of the Province, your Commission also visited a few of the farms surrounding these cities and towns. In the "production, care and distribution" of milk, it was recognized that the most important part is the production. While milk may be contaminated in the distribution and through lack of care thereafter, it can never be made pure and wholesome if it is contaminated at the source of supply. The source of supply must be the starting point in any consideration of this great question. Altogether, we visited upwards of one hundred different dairy farms in all sections of the Province. An effort was made to see all kinds—good, bad and indifferent—not with the idea of being able to pass mature and final judgment upon the conditions around any one city, but rather to gain an idea as to conditions in general throughout the Province.

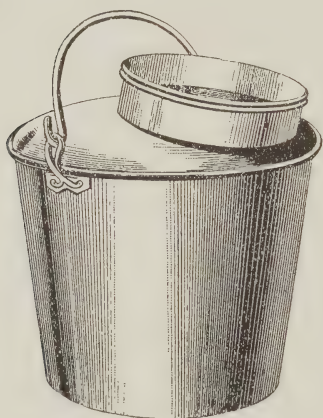
Dairying, with few exceptions, is carried on as part of mixed farming. Dairy stables therefore are most invariably just part of the general barns. There are probably not more than a dozen and a half exclusively dairy stables—utilized solely by cows—in the Province. The average barn is the bank barn, which means that the cattle are usually stabled under the same roof as the horses, with the grain stored above both. In some cases the cattle are completely partitioned off from the horses, but often this is not done. The old idea in the building of a bank barn was to secure the maximum of warmth, and in the great majority of cases this has been accomplished at the sacrifice of light and ventilation. In altogether too many instances they are dark and lacking in pure air. In some of the best bank barns the ceilings were found low and the windows very small.

To these stables the cattle come only for milking in the summer, but in them they live in the winter. Many stables were found to be equipped with stanchions and with troughs or fixed small tanks for water. In a number of cases the water trough was located at the pump or windmill some little distance from the buildings, but in a few instances the water supply was right in the barnyard and was surrounded by foul-smelling, stagnant pools. In the matter of cleanliness, there was the same great diversity of standard. In a few notable instances the manure was taken out of the stable once or twice a day and immediately hauled a hundred feet or so from the barn, but the piles of manure which may be seen close to the average stable door prove that this practice is not as common as could be desired. It was frequently noticed, even in fairly good barns, that the ceilings were decorated with numerous cobwebs, or hay or straw from the barn above. A large number, however, were found to have concrete floors and the use of concrete for this purpose appears to be steadily on the increase. In some cases care had been taken to prevent dust by having the stable ceiling of grooved and tongued lumber or rougher material of double thickness with paper between.

METHODS OF HANDLING MILK.

In addition to producing, some dairymen adjacent to the smaller cities also do their own distribution, and on such farms the equipment is naturally more elaborate. A few even are equipped with bottling plants. Where the milk has only

to be taken to the gate or to the city in an eight gallon can, the equipment is not so complete. In the first place, the matter of washing the milk pails and cans is generally looked after by the women of the house and the sight of the milk pails and cans standing upside down against the wall of the milk house in the open air and sunshine is a familiar one on the Ontario dairy farm. The ordinary broad-top pail is in common use, very few small-top pails having yet been adopted. No particular attention is paid to the matter of the milking stool and one of wood constitutes the almost invariable type and often far from clean. It is probably safe to say that the majority of dairy farms are now equipped with a milk house of some kind, some merely a simple, wooden structure and others of more pretentious brick or cement. It cannot be said, however, that the majority have ice houses, although a considerable number have. The majority rely on cold water



Small-top pail reduces contamination by twenty-five per cent.

from the spring, and especially in the numerous well watered dairy sections, there is a plentiful supply of this. Those who have not milk houses have a tank fitted up in some convenient place or have a room off the stable equipped with an aerator over which they run the milk to cool it immediately after milking. Recent experiments conducted by the Department of Agriculture at Ottawa and dealt with at greater length in another chapter, show that this is to be strongly condemned. In one instance it was found that a big concrete tank for cooling the milk had been built in the stable immediately behind the cows. This was done to "save trouble" and quite oblivious of the contaminating effect it would have on the milk. Although it is carried out with varying degrees of efficiency, the wisdom of prompt chilling of the milk is very generally recognized. One case, however, was found where the dairy-

man explained that he did not bother cooling his morning milk because his customers in the city thought they were not getting it fresh unless they got it warm from the cow. On the other hand, a dairyman in Northern Ontario followed the laudable practice of using cans with ice tubes which extended from the lid about one-third down the can. The ice therein contained was a guarantee that the milk would not attain an abnormal temperature before being delivered to the consumers.

PLENTY OF ROOM FOR IMPROVEMENT.

These few general commonplace facts constitute the story of the methods in vogue on the dairy farms of the Province. Something more definite is essential, however, in order to determine the necessity or otherwise for reform and improvement. Looking at the matter from the Provincial standpoint, we are bound to say that we found no basis in fact for the sweeping and alarmist statements which are sometimes made in reference to conditions on the farm or the scathing denunciations so often heaped indiscriminately upon the dairyman. In so saying, we do not wish to conceal the fact that in a percentage of dairy farms the premises and methods are so filthy that they would not be tolerated for a minute in any other place where food for human consumption was being produced. Thanks



A not uncommon Ontario stable yard, through which cows must wade to the milking place.



But many careful Ontario dairymen remove manure promptly to a considerable distance to secure cleanliness in milking.

to the high standard which has been attained in a few sections, notably Ottawa, the general average in Ontario would probably compare favorably with other provinces or states. We are confident that for cleanliness and sanitation many of the barns we visited in this Province would score as high as any on this continent, aside of course from that special class represented by the Tully and Brookside farms. But this is not a matter which can be "averaged" in the usual sense, for it is obvious that good conditions in parts of the east and bad conditions in parts of the west do not make average conditions in the centre. It was satisfactory, however, to find that it is unnecessary to go outside our own Province for types which may well serve as a standard to which all should seek to attain. About ten per cent. of the places visited seemed to be totally unfit to be in the business of producing human food at all. The barns were dark and dirty, with practically no ventilation



Well lighted, well ventilated, well drained Eastern Ontario stable.

and consequently an abundance of germ-laden atmosphere. A slovenly carelessness characterized the premises and naturally also the people responsible therefor. About these there was scarcely a redeeming feature, and their continuance in the business was due solely to the fact that the consumers did not know where their milk came from. On the other hand, in the case of probably sixty per cent. of the barns, the expenditure of from \$10 to \$50 and a little extra work would effect an improvement of fifty to seventy-five per cent. The owners were doing what they considered necessary, but at the same time exemplified the truth that there is a vast difference of opinion as to what constitutes cleanliness.

OTTAWA LEADS THE PROVINCE.

It is only fair to say that the best conditions prevailed where the greatest attention was paid to the matter and where the closest supervision was exercised.

In this regard the barns surrounding Ottawa easily lead the Province, while London and Woodstock are deserving of special mention. In all these places a veterinarian has been engaged inspecting the premises and instructing the farmers to attain and maintain a high standard. A dozen barns chosen indiscriminately in the vicinity of Ottawa were visited when the cows had gone into their winter quarters. Every one of these was nicely whitewashed and free from cobwebs, dust or other dirt. Almost all had cement floors which were cleaned out twice a day, the manure in many cases being loaded right on a sleigh and hauled away. A separate milk house was located twenty-five feet or more from the barns, which were generally well supplied with water, light and ventilation. In addition to all this, the cows were kept looking sleek and clean, the hind quarters and the udder being closely clipped in almost every case. In one barn the operation of clipping the cows was in progress when we called and we were informed that it only required about ten minutes to go over each animal. The result not only improved the animal's appearance, but made it an easy matter to keep it clean during the winter months in the stable and thus greatly minimized the danger of contamination to the milk. This very commendable practice appears to be adopted to a much larger extent around Ottawa than in any other part of the Province, in many portions of which it is entirely unknown. Individual premises equally satisfactory were found in many other parts of the Province, but the uniformity of the high standard of the stables visited around Ottawa impressed your Commission as reflecting credit on the intelligence and progressiveness of the farmers as well as on the supervision of the municipal authorities, and constitutes an example worthy of general emulation.

Of the other exemplary illustrations, a farm in London Township may be cited. The owner kept a herd of 30 to 40 grade cows which were all bought subject to the tuberculin test. The barn was the one shown in the cut as "an average Ontario bank barn." While it did not have quite as much light and ventilation as might be desired, the interior was whitewashed twice a year and the floor sprinkled with lime daily. The manure was hauled over one hundred yards from the buildings. Before milking the udders of the cows were well brushed. The milk was promptly removed to the milk house twenty-five yards away, where it was promptly cooled. This milk is delivered in the city at five cents a quart, chiefly in large quantities to hospitals and hotels. In almost every district a few such illustrations are to be found leading the way to general improvement.

CHAPTER IV.

Being the Story of the Efforts on the part of Rochester, Syracuse, New York and Detroit to Secure a Clean Milk Supply and of the Working of the new Pasteurization Ordinance in Chicago, as Gathered by a Personal Visit.

In deciding to undertake a visit to large American cities, the Commission recognized the fact that pure milk is primarily a problem of large populations, and was actuated by a desire to acquaint itself with the methods being adopted by the populous metropolitan centres upon which the problem has been forced.

The feature of the Rochester supply is undoubtedly the infants' milk depot plan as described in another chapter. For safeguarding the general supply, Dr. G. W. Goler, the Health Officer, administers a system of inspection which extends from producer to consumer. Dr. Goler is a strong opponent of pasteurization. He described it to your Commission as resulting in "cooked dirt," as encouraging uncleanness on the farm and as being injurious to infants by "killing the more harmless micro-organisms while leaving the more dangerous to multiply." "Commercial pasteurization," however, is carried on by a number of the dairy companies of the city. In addition to inspection, Dr. Goler believes in a bacteria count as an indication of the conditions under which milk is handled and also in making a systematic fight against tuberculosis.

Rochester's standards are as follows: For butter fat and total solids, 3 per cent. and 12 per cent.; for bacterial count, 100,000; for temperature, 50 degrees. No pretence is made to drag a man to the police court if his bacterial count goes above 100,000 or if the temperature of his milk runs above 50 in very hot weather. In fact, in 1908, 1,015 bacteria samples only 42 per cent. were under 100,000 and the average was 415,572. But as soon as a milk sample goes above 100,000, the attention of the dairyman is called to the matter, and should it go above on three successive counts, his milk is refused admission to the city. Similar latitude is exercised in regard to the temperature test. It is desired to impress upon dairymen the necessity for keeping the milk cold during transit to the city by either train or wagon, and very gross violation is accepted as justification for keeping milk out of the city.

During 1908, W. O. Marshall, Rochester's Chief Milk Inspector, visited 928 cow stables in the country and 457 milk rooms in the city, some of each more than once. The score card system is used. During the year, 87 producers were refused admission to the city because of the unsanitary condition of their barns or their unsanitary way of handling milk. Almost all of these followed the suggestions of the health officers, and in the course of a few weeks made such improvements as led to the rehabilitation of their reputation and the re-admission of their milk to the city market. Of course, drastic action, such as keeping a producer out of the city market, occasionally raises a storm and recourse to law is taken. But Dr. Goler claims he has authority under the city charter to protect the health of the citizens in this way, and although actions have been launched in the courts, his authority has never been successfully disputed. Thus, by the gentle persuasion of visits by inspectors and by the more drastic persuasion of force, the Rochester Health Department is seeking to educate the dairy farmer up to a high standard of cleanliness. Thanks to the goodly strain of Jersey blood in the milch

cows, the butter fat average of 3,281 samples in 1908 was 3.9. There is therefore nothing to complain of on that score. But as to cleanliness and the sanitary condition of the dairies, either in the country or in the city, Dr. Goler does not claim perfection. In this your Commission, after personally visiting several dairies and farms, are not inclined to disagree with him. They regard themselves as unfortunate in being unable to find much in the places visited that would be any inspiration to the dairymen of Ontario.

DEALING WITH TUBERCULOSIS.

But there is one other feature of the Rochester system which seems well worthy of special notice and that is their method of dealing with tuberculosis. "Do you accept the theory," Dr. Goler was asked, "that the bovine tuberculosis is communicable to man?" "As far as adults are concerned," was the reply, "I have never been able to positively identify the bacillus, but as far as children are concerned, there is absolutely no doubt of the transmissibility." In fact Dr. Goler went on to say that he was convinced by his own experience that fifteen per cent. of the tuberculosis among children is of bovine origin. He had not yet, however, thought it practicable to insist on the tuberculin test on all cattle supplying milk to the city, but some six months or so ago he began a series of tests on guinea pigs in the laboratory which occupies the top floor of his East avenue office. Guinea pigs, which, as is well known, are peculiarly susceptible to tuberculosis, are inoculated with a sample of milk and then left for six weeks, at the end of which time they are killed. It so happened that on the occasion of the visit of your Commission the time had arrived when several of these animals should lay their heads on the altar of science. "See here," explained Dr. Goler, as he exposed the internal organs to the view of your Commission, "those little white spots are lumps of tubercles or tubercles filled with germs of consumption or tubercle bacilli. That is what we call ocular demonstration, for it is visible to the layman who is not a doctor. We hold that that proves conclusively that the milk was laden with tubercular bacilli, and we send this ocular demonstration to the man from whom the milk came and then we say to him that unless he has all his cattle tuberculin tested within a week, his milk will be shut out of the city." Although this plan was adopted only a short time ago, it has resulted in several herds being tested and several tuberculous cows being disposed of. As will be explained later, the matter of tuberculin testing and compensation for losses is handled by the State authorities.

With regard to contagious diseases, Rochester has a regulation compelling all milk producers to report all such outbreaks promptly to the Department, and in 1908 the inspector spent 28 days investigating contagious diseases in the families of milkmen.

PASSING ON TO SYRACUSE.

Syracuse has not loomed large in the literature of the milk question and yet from many points of view it proved one of the most interesting places visited by your Commission. Although it is a city of only 124,000 population, its municipal organization includes in addition to the health officer, a deputy health officer, who devotes most of his time to the milk supply; a dairy inspector, a veterinarian, and a laboratory where bacteriological and other tests are made, all of which support its claims to being distinctly progressive on the subject. As is the case in other American cities, this constitutes a branch of work which comes under the super-

vision of an official known as the Commissioner of Public Safety. Dr. D. M. Tottman is the Medical Health Officer, and Dr. Thos. F. Foreman, Deputy Health Officer, and to these gentlemen, headed by their Chief, S. T. Friedrich, Deputy Commissioner of Public Safety, your Commission desires to express their indebtedness for many courtesies and much kindness.

But this equipment, at least in its present completeness, is of recent origin and incidentally for that reason evidences the growing interest and importance being attached to the question of the milk supply. The present system was inaugurated only about two years ago and its efficiency was soon tested by the tracing of a couple of epidemics of disease directly to the milk supply. A ledger is kept to record the number of contagious diseases on the route of each peddler. This is called the "tell-tale ledger," and in September, 1907, the tale it told was that eight cases of typhoid fever had broken out on the route of a certain milk producer, and upon investigation it was found that two cases of typhoid fever existed in the family of the producer. The milk supply was immediately prohibited from entering the city and the epidemic was checked. A few months later an epidemic of diphtheria broke out and it was also described as being "milk borne" and proved to be more than usually virulent. Altogether nearly forty cases got headway before the disease was stopped. They were found to be on three milk routes, the majority being on the route of a man in whose home there had been two cases of diphtheria during the summer and fall, and the balance on the routes of two men who got their supply from the first mentioned producer. Thus the entire outbreak was traced to the same source.

EDUCATION AND CO-OPERATION.

When Syracuse started out to deal with the milk problem in a systematic way, they first had a set of ordinances to be known as health ordinances, adopted by the City Council, but the underlying keynote of their system has been co-operation and education on the part of those responsible. It was after some agitation that these ordinances were adopted by the council. They embodied many of the regulations in force in other cities and some others. They first of all set forth clearly that no milk should be sold:

- (1) Containing more than 88 per cent. of water or fluids;
- (2) Containing less than 12 per cent. of milk solids;
- (3) Containing less than 3 per cent. of fats;
- (4) From which any part of the cream had been removed;
- (5) Having lactometer reading less than 29;
- (6) Containing any boric acid or salicylic acid, formaldehyde or other foreign chemicals.
- (7) Containing bacteria of any kind more than five hundred thousand (500,000) per cubic centimetre;
- (8) Drawn from any cow having a contagious or communicable disease;
- (9) Drawn from any cow within fifteen days before or five days after parturition;
- (10) Having a temperature over 60 degrees or which has been stored at a temperature higher than 50 degrees F.

Then in addition to providing for the sterilization of the bottles, the regulations went one step farther. They provided that no milk or cream should be

sold in any store or shop except from bottles and except when kept at a temperature of less than 50 degrees F. Keeping milk in a living or sleeping room or in a room not kept clean at all times or in cans not made of well-turned iron with inner surface smooth and free from rust is strictly forbidden. A city inspector is employed to see that these regulations are enforced.

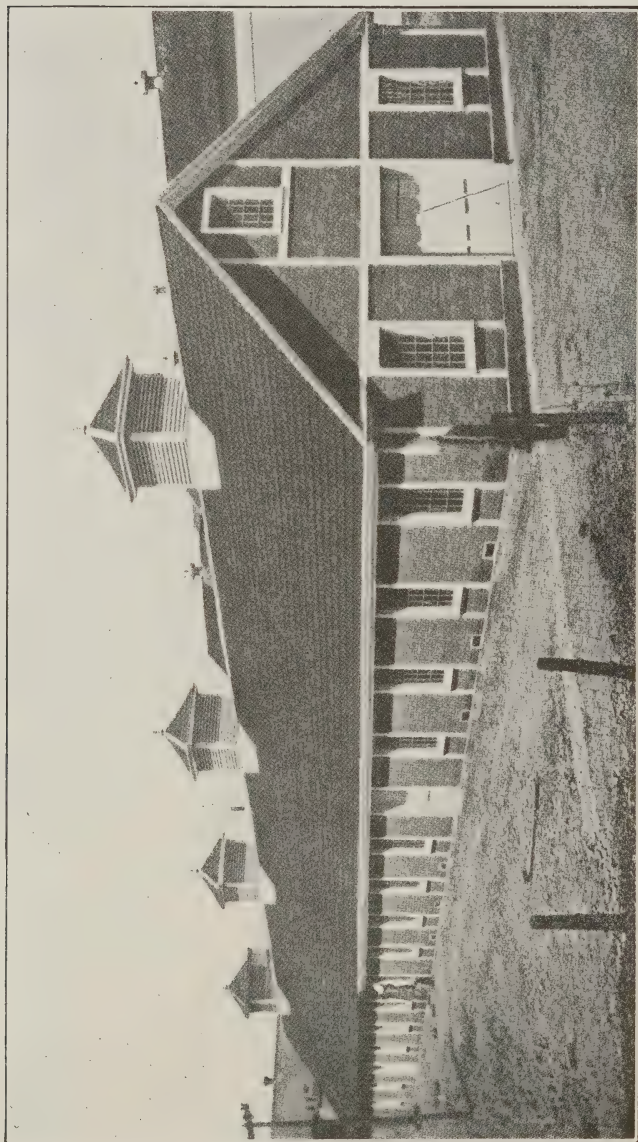
AIM AT CLEANLINESS RATHER THAN PASTEURIZATION.

But a strong feature of the work was the securing of cleanliness at the source of production—the farm. The Health Department did not adopt or even encourage pasteurization; in fact the Health Officer expressed himself to your Commission as being convinced that pasteurized milk was injurious to infants under one year of age, producing rickets and scurvy in some cases. To secure cleanliness on the farm a dairy inspector with tact as well as knowledge was secured, and he, sometimes with the Health Officer or his assistant, went out among the dairy farmers and quietly explained things to them and showed how improvements could be made with advantage to themselves and safety to the public. One result was that although efforts toward reform were met with the objection that it “would drive the farmers out of the dairy business,” there were 317 in the dairy business at the time of the passing of the by-law and there are now 400.

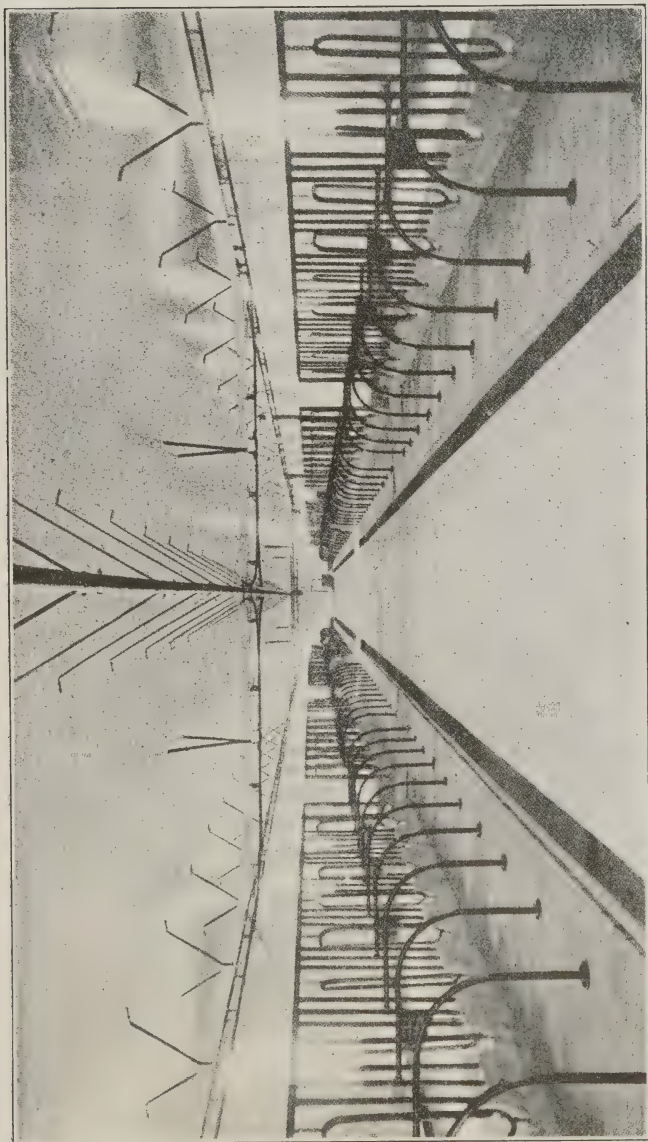
The system adopted was the score card system drawn up by the Washington authorities. It was provided that no license should be granted to any dairy which did not receive a total score of 50 per cent. or better and also that any license could be revoked if the premises fell below a 50 per cent. score. Applicants were required to state the source of their milk supply and so the conditions in the country were passed upon by an inspector before the license was granted. The progress made is shown by the comparative figures for two years. In 1907, the average score was 51.45; in 1908, it was 64.33. In 1907, there were 7 between 70 and 80, and in 1908 there were 37; in 1907, there were three between 80 and 90, and in 1908 there were 31; in 1907, there were 3 between 90 and 100, and in 1908 there were 8, 4 of the latter scoring 99. There were 5,759 cows supplying milk to the city and all these were inspected by a veterinarian, 47 being removed because of bad udders and teats and one suspicious herd being tested with tuberculin and 11 condemned.

CLEANLINESS DOWN TO A SCIENCE.

If there is anything in the power of a good example, then Syracuse is fortunate in having among its dairies the Tully Farms. At the Tully Farms cleanliness has been reduced to a science, if not to fastidiousness. It may as well be understood in the first place, however, that the Tully Farms are owned by a wealthy manufacturing company, the Solvay Process Company. Finding they were being prosecuted for damages as a result of sinking drills which were necessary in their business, they decided to purchase outright two or three thousand acres about twenty miles from Syracuse. Only requiring a small portion of this area in their manufacturing process, the owners were induced to go into the dairy business and they went in on broad, generous, ideal lines. A brief description of their premises and methods may be of interest as evidencing the importance and dignity with which modern thought has invested milk and its production, even though the standard attained may not be within the reach of the average dairyman.



Tully Farm model stable.



Interior Tully farm model stable.

It is somewhat of a temptation to dwell with poetic fervor on the alluring pastoral scene into which the grazing kine, the green hills and the nestling lakes which make up the Tully Farms might be painted. But it is the utilitarian rather than the artistic aspect of all these things which must be made prominent. The "grazing kine" are just cows—tuberculin tested, sound and healthy to be sure—but not thoroughbred or specially fancy. The "green hills" are appreciated for the pasture they afford rather than for the not unimportant part they fill in the landscape scheme of Onondaga County. And the "nestling lakes" are worthy of note in this chronicle because their very adjacency enables the barns to be supplied with plenteous quantities of pure water which from time immemorial has been one of the first aids to cleanliness.

KEEPING EVERYTHING CLEAN.

As the Commission entered the Tully yards one bright afternoon just before milking time, they were impressed with what a handy thing it is to have an abundance of water on the premises. A large hose attached to a nearby hydrant had just completed the laying of the dust all around the cow barn where the milking is done, and especially in the vicinity of the doors. "That," explained G. C. Watson, the General Manager, who with R. D. Woolsey, A.M., LL.B., Dairy Superintendent, showed your Commission every courtesy, "helps to keep down the bacteria by minimizing the possibility of any bacteria-laden dust getting in the milk."

Inside the barn, which is of simple enough construction of stone walls, cement floors and iron stanchions, the same generous distribution of water was in progress. But before entering it is to be noted that everyone had to put on a clean white coat lest some of the dust from their clothes contaminate the barns or cows. The hose is turned on the ceiling, the floor, and the cows, until only a few irrepressible flies are left to remind one of the unceasing menace of the germ kingdom. But the cows are not yet ready to be milked. A man goes along with a pail and a cloth and washes off the rear flanks and udder. This operation is repeated by a second man, and a third devotes his attention to the udder only. By this time—which is after all only a matter of a few moments—it is regarded as reasonably certain that the cow will not give anything but milk, and men in sterilized white suits, clean every morning, seated on sterilized metal stools, proceed to milk with sterilized, manicured hands into sterilized, small-top pails. As each cow is milked—and of course the fore-milk is always discarded—the milk is carried to a little room at the side where it is weighed and the weight recorded, together with the number of the cow and the number of the milker. This enables the company to tell whether a cow is keeping up its record and whether the milkers are keeping up theirs. This record duly made, the milker goes back to another cow, but of course not without first washing his hands.

VERY LOW BACTERIA COUNT.

From the little milk room, the milk is quickly transported across to the bottling plant some twenty yards away. This building is of concrete, and including the plant is said to have cost \$40,000. The bottling room is absolutely dust-proof and no one is allowed to enter except one or two employees who direct the machinery. The milk passes over the cooling apparatus, then through other tubes into the bottles, which are already in the boxes and which are immediately shifted to another point where the covering is placed on by the same automatic machinery.

Thus it is not necessary for employees to touch the milk at all, and the bottles, capped and sealed, are immediately stored in the ice room until they are shipped to New York in the morning, bountifully buried in ice.

All this conduces to a low bacteria count, never above a thousand and sometimes as low as two or three hundred. If the count goes above one thousand, there is an investigation at once. This milk is sold for 12 cents net by the producers. It is certified by the Academy of Medicine of Syracuse.

No hay or food is kept in the barns and the droppings are frequently taken away in a truck.

When the cows are kept in the barn during the cold weather, a night man is employed at the barn, a sort of "night nurse." It is his duty to see that all the cows are safe and comfortable. If any cow gets twisted in its stanchion, the night man is there to relieve it. Then, too, a veterinarian is always within call.

The management does not accept the doctrine that it is better to have one man milk the same cow always. They figure that while there may be merit in this idea, if a cow gets accustomed to one particular milker, and then because of illness, holidays or other cause which is bound to occur, the man is away, the change does more harm to the cow than the other system does good.

The Tully Farm Company has two other herds, in all some 300 cattle, said to be handled in like manner, but of course we had time to visit only one.

THERE ARE OTHERS ALSO CLEAN.

This farm receives a score of 99 on the score card system, but the Commission was shown another dairy farm which also scored 99 and which did not have the expensive, if not lavish equipment herein described. It was not large or showy, but the stable with its cement floors and stanchions was kept neat and clean, as was also the cooling and bottling plant a short distance away. The proprietor and manager was a big, good-natured man who said he drank a quart of milk every night before retiring and thus got interested in the question of pure milk. He declared he was making money selling milk at ten cents a quart and had no difficulty in getting customers for all he could supply, although the regular price in Syracuse was seven cents a quart.

Still another farm at which the milk which retailed in the city at seven cents was produced was visited. It was managed by two young farmers to whom the dairy business was only a branch of their farm labours. They had an ordinary bank barn, but the interior was whitewashed and clean and there was a noticeable disposition to make the best of the facilities at their disposal.

In fact, as has already been commented, what impressed the Commission was the spirit of co-operation which evidently existed between the health authorities of the city and the milk producers of the country. The health authorities endeavored to be reasonable and the farmers endeavored to meet reasonable requests in improving their premises.

Dr. Totman described the results obtained after two years of inspection as "simply marvellous."

NEW YORK'S ENORMOUS PROBLEM.

In the city of Greater New York, we had an opportunity of studying the methods taken to safeguard the milk supply of practically twice the population of the entire Province of Ontario, packed into only a fraction of the area. To supply

nearly five million people with nearly two million quarts of milk a day—that is the enormous problem of New York, a problem enhanced by the varying classes, races and languages, from the millionaires of Fifth Avenue, who can pay twenty cents a quart, to the poor struggling mothers of the Bowery who must buy their milk by the half pint. Dr. Thomas Darlington, Health Commissioner, is the man upon whom falls the responsibility of protecting these millions as far as may be from contaminated milk. Nearly six years ago he accepted this responsibility, and the record of reform which he has achieved not only attests his success but furnishes an inspiring story to those who face the same problem in less complicated form.

Before Dr. Darlington became Health Commissioner, he was somewhat of a specialist in infantile diseases, and hence his sympathies as well as his energies were promptly directed towards improving the milk supply with a view to saving the lives of the babies. He was confronted with the fact at the outset that the milk of New York City came from about 35,000 farms scattered through six States extending as far away as 400 miles. There had been considerable trouble with both water and formaldehyde in the milk and each person who handled the milk put the responsibility on the other. Dr. Darlington concluded that a definite plan of action was imperative and he decided to find out exactly what conditions were.

Two experienced inspectors were engaged to make a preliminary survey. They went to the dairies, they went to the “creameries,” they went to the milk shops. “Creameries,” be it understood, are a feature somewhat peculiar to New York City and do not mean the same as the word “creameries” means in Ontario. They are merely the milk receiving stations, located in the country, to which the milk is delivered by the farmers before being shipped to the city. There are between 800 and 900 of these stations in the multifarious organization which supplies milk to New York. To these the inspectors went, and to some of them Dr. Darlington accompanied them, to become personally acquainted with the conditions, and the loss of his breakfast was one of the incidents indicating conditions at one point of inspection. In fact there was nothing very encouraging in the entire situation, but a start was immediately made to raise the standard. A personal letter was sent both to farmers and creamery owners stating specifically what was necessary to improve their particular premises. Photographs taken on the spot were sent out to further accentuate the necessity for improvements. An attitude of firmness was maintained by the Health Commission alike toward the large creamery proprietor who had \$100,000 at stake and the small dairyman of whom an outlay of \$5 was all that was asked. Regulations were adopted and instructions printed on strong, durable linen, and 30,000 copies of these were posted up for the guidance and education of the dairymen. Then all this was followed up with more detailed and more rigid inspection. There was a loud outcry that all these restrictions would drive the farmers out of business, and it drove out exactly 47 out of the total 35,000, and most of these were admitted after they had made the required improvements.

CLEANLINESS THE MOTTO; INSPECTION THE METHOD.

Dr. Darlington is a firm believer in the merits of inspection and information. He considered that clean milk was the ideal after which the Department should strive and to obtain it he inaugurated a system of inspectional supervision extending as rigidly as possible from the cow to the consumer. Heretofore there had been inspectors in the city, but inspection of the farms—the sources of the

supply—was made the strong feature. Soon the territory shipping milk to the city was divided into districts and sixteen country inspectors were at work with the result that in 1907 there were 22,500 inspections of dairy barns and 8,900 inspections of milk receiving and shipping stations. The Department did not claim any real "authority" to inspect outside the municipality of New York, but they did claim the authority to designate the conditions under which milk should be produced and handled before it was admitted to New York, in proof of which over 41,000 quarts of milk were destroyed in 1907 because of being either over 50 degrees temperature, being sour or being adulterated. While some objection was offered at first to the inspection of the farms and the inspectors were dubbed "Darlington's Devils," it did not prove either general or enduring, and the inspection has now come to be looked upon as a distinct advantage. The farms by the score card last year averaged 57 per cent. and this year it is expected they will average ten points higher. But the usefulness of inspection with the score card system has been demonstrated in other concrete forms. For instance, some of the larger milk companies have given notice that the whole contract price will be paid only to those dairies scoring 60 per cent. or over, a lower price will be paid to dairies rating below 60 per cent, and no milk to be accepted from any dairy not scoring 50. Thus a good score has a commercial value, and this is further taken into consideration in the sale or rental of the farm. By way of educational influence, the milk inspectors deliver addresses at Grange meetings, at Farmers' Institutes, and before Agricultural Societies, Boards of Trade and Departments of Health. That this is not driving men out of the dairy business is shown by the fact that there are now more than 5,000 more farms supplying New York than when the inspection was first adopted. Then, too, inspection of the receiving and shipping facilities and the large distributing plants and small stores is maintained vigorously.

MILK STORES IN THE SLUMS.

Members of your Commission accompanied one of the inspectors on some of his rounds in one of the poorest and most congested sections of New York. Milk is sold from cans in quantities of from one-half pint up, in stores which also serve their customers with groceries, cheese, butter, eggs, meat, vegetables, fish and numerous other household necessities. Little do these people—uneducated foreigners most of them—know of hygiene or bacteria, and such conditions are the despair of sanitarians. Back of one little store was a living-room, perhaps ten by twelve feet; off this room was a disgusting, ill-smelling lavatory, which also served as the sole passageway to the single bedroom, about six by ten in size, dank, low and without light, without air, without sunshine. Here human beings lived and did business and here milk was sold. It would be idle to expect anything like perfection, and yet it was evident that the vendors, even though they could speak little English, had a healthy respect for the milk inspector; a respect probably born of police court experience which is notoriously expensive. It was evident also that through careful supervision the milk was handled in a manner which practically assured its being at least purer than the surrounding atmosphere. In the first place the milk cans, which are of course covered, are kept in round wooden tubs surrounded by ice. These tubs are also kept covered and are placed at the front of the store. In fact there is not supposed to be any passageway between the store and living room, though this ordinance is sometimes evaded. However, by keeping the milk cans in covered ice tubs at the front of the store, it is kept from coming in contact with other commodities. Then, in the second place, the vendors are

being educated to use the "one-piece dipper." It is just the ordinary shaped dipper only the handle and cup are of one piece and there are therefore no joints or corners to collect and secrete the filth which might accumulate during the frequent openings of the cans and dipping of the milk. Altogether it seemed evident that considerable had been done by inspection to safeguard the milk supply even of the slums.

"HEATING," DISTINGUISHED FROM PASTEURIZATION.

Officially, New York's Department of Health is opposed to pasteurization. Naturally, there has for some time past been a big agitation to secure a pasteurization ordinance, but thus far it has failed. One explanation as given by Dr. Darlington himself is simply this: "If I went to the Board of Estimate for money, they would say, 'Is pasteurization the remedy for the milk supply?' If I should say 'yes,' they would ask, 'Why spend money inspecting the farms?'" Hence, Dr. Darlington considered pasteurization would be starting wrong. He considered that inspection of the dairies was more important than pasteurization. But the Department permits pasteurization, only it demands that any process through which the milk passes must be clearly marked on the bottle cap. It does not allow milk to be run through a heating apparatus for thirty seconds and then sold as "pasteurized." Such milk bears the words, plainly printed on the stopper, "heated to 160 degrees for 40 seconds," together with the date and time of the completion of the process. Special permits are required for pasteurization and milk heated to 150 degrees for thirty minutes and immediately cooled may be sold as "Perfectly Pasteurized Milk." The labels must also bear the date and hour when pasteurization was completed, delivery to be made to the consumer within forty-eight hours, and milk must not be pasteurized a second time. The following fac-simile illustrates clearly the distinction drawn between "heated" and "perfectly pasteurized" milk.



Bottle caps emphasizing distinction between "heated" and "perfectly pasteurized" milk.

The Department also extends the stamp of its official recognition and regulation to selected milk, inspected milk, guaranteed milk, certified milk, skimmed milk, condensed skimmed milk and condensed milk. Each is defined and each if sold under the name must come up to the standard required.

WASHING BOTTLES; COUNTING BACTERIA.

New York has a regulation not common to many cities by which it declares it to be the duty of everyone to clean or cause to be cleaned immediately upon emptying, all bottles, cans or other receptacles used in handling milk. It is also made an offence to use such bottles, cans, or other receptacles for any purpose other than holding milk. The object is to prevent bottles and cans from getting into such a filthy condition as to almost defy the most thorough sterilizing. It was found that if a bottle or can is merely rinsed and water left standing in it until it is returned to the dairy to be sterilized, it is in a much cleaner, sweeter condition than if the dregs of the milk were left to sour and become putrefactive.

Of course the Department has a laboratory in which bacteriological tests are made, but no special emphasis is laid on this phase of the work. No bacteria limit is fixed, but the term "excessive" is used instead, and when the number found is regarded as "excessive," the dealers are notified that improvements must be made. The Health Department determines what constitutes "excessive." Speaking of the bacteriological tests, in the latest report of the Department it is said: "In many instances pasteurized milk was found to contain bacteria by the million, while some milk shipped from the country in raw state had very low counts, some being as low as 10,000 per cc."

Reports are demanded each week as to the existence or non-existence of typhoid, tuberculosis, diphtheria, scarlet fever, dysentery or any other infectious diseases among any of those handling milk.

Great importance is attached by the Health Department to the necessity for keeping the milk cold at all stages. When milk is cold the bacteria will not proliferate. The ordinance calls for a temperature below 50 degrees F., and in 1907 over 31,000 quarts of milk were destroyed because the temperature exceeded that limit. Last year there were altogether over 11,000 prosecutions in the courts of New York in respect to the milk laws for lack of cooling, adulteration and other offences. Adulterated milk is defined in the code as follows:

- (1) Milk containing more than eighty-eight per centum of water or fluids;
- (2) Milk containing less than twelve per centum of milk solids;
- (3) Milk containing less than three per centum of fats;
- (4) Milk drawn from animals within fifteen days before or five days after parturition;
- (5) Milk drawn from animals fed on distillery waste, or any substance in a state of fermentation or putrefaction, or on any unwholesome food;
- (6) Milk drawn from cows kept in a crowded or unhealthy condition;
- (7) Milk from which any part of the cream has been removed;
- (8) Milk which has been diluted with water or any other fluid, or to which has been added, or into which has been introduced, any foreign substance whatever;
- (9) Milk, the temperature of which is higher than 50 degrees Fahrenheit or which contains an excessive number of bacteria.

DR. PARK ON MILK BACTERIOLOGY.

Your Commission also had the advantage of an interview with Dr. W. H. Park, head of the Bacteriological Department of the New York Board of Health and one of the very foremost bacteriologists. In reference to pasteurization, he intimated that pasteurized milk had disadvantages as against pure, clean milk for

infants under one year, but he was strongly of the opinion that pasteurized milk was very much safer than the ordinary raw milk. He brought to our attention a series of experiments carried on by himself and Dr. L. E. Holt, showing the relative effects of pure and impure milk on infants in the tenement houses and institutions of New York. These experiments he summarized in part as follows:

"During cool weather neither the mortality nor the health of the infants observed in the investigation was appreciably affected by the kind of milk or by the number of bacteria which it contained. The different grades of milk varied much less in the amount of bacterial contamination in winter than in summer, the store milk averaging only about 750,000 bacteria per cc.

"During hot weather when the resistance of the children was lowered, the kind of milk taken influenced both the amount of illness and the mortality; those who took condensed milk and cheap store milk did the worst, and those who received breast milk, pure bottled milk, and modified milk did the best. The effect of bacterial contamination was very marked when the milk was taken without previous heating; but, unless the contamination was very excessive, only slight when heating was employed shortly before feeding.

"The number of bacteria which may accumulate before milk becomes noticeably harmful to the average infant in the summer, differs with the nature of the bacteria present, the age of the milk, and the temperature at which it has been kept. When milk is taken raw, the fewer the bacteria present the better are the results. Of the usual varieties, over 1,000,000 bacteria per cc. are certainly deleterious to the average infant. However, many infants take such milk without apparently harmful results. Heat above 170 degrees F. (77 deg. C.) not only destroys most of the bacteria present, but, apparently, some of their poisonous products. No harm from the bacteria previously existing in recently heated milk was noticed in these observations unless they had amounted to many millions, but in such numbers they were decidedly deleterious.

"When milk of average quality was fed sterilized and raw, those infants who received milk previously heated did, on the average, much better in warm weather than those who received it raw. The difference was so quickly manifest and so marked that there could be no mistaking the meaning of the results. The bacterial content of the milk used in the test was somewhat less than in the average milk of the city.

"No special varieties of bacteria were found in unheated milk which seemed to have any special importance in relation to the summer diarrhoeas of children. The number of varieties was very great, and the kinds of bacteria differed according to the locality from which the milk came. None of the 139 varieties selected as most distinct among those obtained, injured very young kittens when fed in pure cultures. A few cases of acute indigestion were seen immediately following the use of pasteurized milk more than thirty-six hours old. Samples of such milk were found to contain more than 100,000,000 bacteria per cc., mostly spore bearing varieties. The deleterious effects, though striking, were not serious nor lasting.

"Of the methods of feeding now in vogue, that by milk from central distributing station unquestionably possesses the most advantages, in that it secures some constant oversight of the child, and since it furnishes the food in such a form that it leaves the mother least to do, it gives her the smallest opportunity of going wrong. This method of feeding is one which deserves to be much more extensively employed, and might, in the absence of private philanthropy, wisely be undertaken by municipalities and continued for the four months, May 15th to September 15th.

"The injurious effects of table food to infants under a year old, and of fruits to all infants and young children in cities, in hot weather, should be much more generally appreciated."

HIGH STANDARDS AT BROOKSIDE FARM.

About sixty miles from New York is the city of Newburgh. About two miles from the city of Newburgh is the Brookside Farm, famed for its production of ideal milk. Being one of the best known of these institutions on the continent, it was visited by the members of your Commission. While it is conducted on the same broad, general principles as the Tully Farms, described in some detail in previous pages, even more scrupulous care is exercised in some points. It is not as extensive as the Tully, but instead of being the property of a large company, it is owned and operated by Mr. S. L. Stewart as a commercial enterprise, and is understood to be paying a profit. The milk has been contracted for by a large New York firm for a period of years at 15 cents per quart on the farm, and is being retailed in New York at 20 cents a quart. In summer time it is sometimes shipped to the wealthy at their summer homes at a total cost of 75 cents a quart.

To show the minuteness of the care necessary to render such prices possible, a few points may be mentioned. The walls and ceiling of the milking room are pure white, covered with imported enamel paint presenting a surface like glass. This is washed thoroughly every day. The stanchions are inch and a quarter pipe, and they are also washed thoroughly every day. To get into this room it is necessary to pass through two doors, one of which was closed before the other opened, thus preventing the possibility of dust. The cows are clipped every three weeks and are groomed, washed, scrubbed and dried before milking. Warm water is used and in drying the udder only one towel is used to each cow. When we visited the stable shortly after milking, not the slightest cow odour could be detected even by rubbing the hand over the cow's udder. Mr. Stewart stated that a luncheon had once been served in the stable to a party of medical and scientific men. In the milking, the men wear white suits, sterilized not once a day but twice a day, so that a clean suit is used for each milking. The same care is carried on in handling the milk and sterilizing the bottles. The cows are mostly Jersey or Guernsey.

With such minute sanitary precautions, it might be expected that the bacteria count would be low. In fact the Brookside Farm claims the honour of being one of the few places on the continent where absolutely germless milk has been produced. This feat has been accomplished several times, while the averages for months at a time frequently go below 100 per cc.

SYSTEM OF STATE COMPENSATION.

To ascertain the position of the State authorities on the question, your Commission visited Prof. C. A. Publow, at Cornell University, where the Dairy Branch of the Department of Agriculture is located, and G. L. Flanders, Assistant Commissioner of Agriculture, and Dr. Devine, Chief Veterinarian at the State Department of Agriculture at Albany.

New York State maintains a large veterinary staff and is giving considerable attention to the question of the tuberculin test. The test has not been made compulsory, but it has been encouraged by free testing and the granting of compensation for slaughtered animals. The Commissioner of Agriculture is empowered to direct the quarantining or slaughtering of any animal found to be tubercular on

a physical examination, or he may compel a test of a suspected herd. Otherwise, tests are made only when the owner makes the request and agrees to abide by the result, disinfect his premises, brand with the letter "T" and slaughter or quarantine those animals which react. The State pays for the veterinarian and the tuberculin, but the owner of the herd agrees to improve faulty sanitary conditions and follow the instructions of the Commissioner designed to prevent reinfection. Diseased animals kept in quarantine may be used for breeding purposes and their milk after pasteurization may be used for butter or cheese or for sale. The young must be separated at birth, but may be fed on the milk pasteurized. The value of each animal slaughtered must be determined by an appraiser. If it is found on post-mortem examination that the animal was wrongly slaughtered and did not have tuberculosis, then the full value will be paid up to a maximum of \$75. If the animal is found to have suffered from localized tuberculosis, eighty per cent. of the total value is paid; if generalized, then only fifty per cent., but nothing will be paid unless the animal has been in the state six months.

During 1908, the State Veterinarian's Department under Dr. J. F. Devine, applied the tuberculin test to 3,520 cattle, and of these 1,200 reacted. A physical examination was made of 2,183 cattle and of these only 29 were condemned. For condemned cattle, the State paid out the sum of \$22,268.90 during the twelve months. "We find," said the Chief Veterinarian to the Commission, "that tuberculosis is more prevalent the farther north we go. One of the chief causes is the defective barn with poor light, poor ventilation and consequently poor atmosphere. The old idea was that the only thing necessary was to keep cows warm, and the result is that many are being stabled under very unhealthy conditions."

RUSTY CANS MAY BE CONDEMNED.

In addition to this work in reference to the tuberculin test, the State maintains two inspectors, located chiefly in New York City, to inspect the milk cans. They work under an amendment of 1907, which provides that all cans or receptacles used in the sale or delivery of milk, cream or curd for human consumption may be condemned and stamped as such when found to be in an unfit condition by reason of "being worn out," badly rusted, or with rusted inside surface, or unclean or unsanitary, or in such condition that they cannot be rendered clean and sanitary by washing and will tend to produce bad flavour, unclean or unwholesome conditions favourable to unhealthfulness or disease."

It is further provided that all cans must be rinsed with water as soon as emptied, and it is specifically forbidden to place in the cans any "sweepings," refuse, dirt, litter, garbage, filth or any other animal or vegetable substance liable to decay and produce unsanitary conditions.

The State standard to prevent adulteration is the same as that of New York City, and the State also has regulations providing for the cleanliness and sanitary condition of cans, utensils, stables and other premises. Certified milk is given official protection by the provision which prohibits the sale of milk as certified unless it bears the certification of a duly authorized medical commission of a duly authorized medical society.

DETROIT'S SYSTEM OF INSPECTION.

In point of population at least Detroit offers a comparatively close analogy to Toronto, and its milk administration is therefore of special interest. As explained to your Commission by Mr. John F. McKinley, the Secretary of the Board

of Health, inspection of the sources of supply was the recently added feature of the work. The Board of Health issues a license to "provide milk for the Detroit market," a license to "sell milk from a wagon," a license to "sell bottled milk from Depot," and a license to "sell milk as food peddler." Each application is made on a separate form and each applicant must answer a list of questions as to the location of dairy farm, the health and feeding of cows, whether they have been tested with tuberculin or not, as to how cans, pails and bottles are washed, whether ice is provided that the temperature may not rise above 50 degrees F. The applicant must also say whether he agrees to abide by the Milk Ordinance of the city. The license is granted on a certificate from the inspector.

The city ordinance provides that no milk shall be sold as pure milk if it contains less than 12.5 per cent. solids or 3 per cent. butter fat, or which has been kept at a temperature above 50 degrees. A fee of fifty cents is charged for the license. To the ordinance is attached a set of dairy rules providing for the white-washing of the barns, the cleaning of the cows before milking, as well as other points making for strict cleanliness. Circulars are distributed by the Board on the care of milk in the home and on the hot weather care of infants.

Early in 1908, two inspectors were appointed to visit the sources of supply. They were veterinarians. After the first year's work, one inspector reported having paid 1,500 visits to 260 farms. Because of being unsanitary, 316 gallons of milk were dumped during the year. There were also 23 farms shut out, but of these twelve were later reinstated on account of having made needed improvements. An outbreak of typhoid fever was traced to the district known as the "Conner's Creek Section," and eight cases were found on the dairy farms of this section. The infection was believed to have been caused by the contaminated water of this creek being used for drinking purposes and for washing the cows. The other inspector visited 408 farms and inspected 4412 cows. Altogether, 128 cows were found to be suffering from disease, including 57 from tuberculosis on a physical examination and 14 on the tuberculin test. Shipment was stopped from several farms until the sanitary arrangements were improved. In the meantime, two inspectors were busy on the dairy premises in the city, and of these 1,468 were visited during the year. Forty-eight dealers were forced out of business.

Mr. McKinley stated that the inspection at the source of supply, although recently inaugurated, was producing beneficial results and would be followed up and extended.

CHICAGO AND PASTEURIZATION.

On January 1, 1909, there went into effect in the city of Chicago a new milk ordinance which may be described as both radical and far-reaching. Briefly stated, it provided that for the next five years no milk, cream, cheese or butter shall be sold in the city unless it comes from cows which have been subjected to the tuberculin test and have not reacted, or unless it has been pasteurized according to the standards adopted by the Health Department. The idea behind the five year clause is that in five years all the cattle furnishing milk to Chicago will have been tuberculin tested. The ordinance was adopted by the City Council in the summer of 1908 as a result of the efforts of Dr. W. A. Evans, Health Commissioner, after a very strenuous controversy, for in this matter Chicago was breaking new ground. There are a few other cities in the United States which demand the tuberculin test, but as far as can be learned Chicago is the only city, and certainly the largest city, to enact compulsory pasteurization as an alternative.

IN ITS EXPERIMENTAL STAGES.

Hence, when your Commission, actuated by a desire to place before the people of this Province the results of any new methods of dealing with the difficult problem of the milk supply, visited Chicago in August, they found the tuberculin testing-pasteurization ordinance still in its experimental stages—also still in politics. They found that Dr. Evans, thoroughly convinced of its merits, was making a faithful and conscientious effort to enforce it.

It was learned that special reasons had led to the adoption of the system. Dr. Evans explained that Chicago in 1908 had the second highest infant death rate of any of the large cities of the United States. This fact in itself was startling and demanded attention. Then, the milk to supply the two and a quarter millions of Chicago's population came from four States—Illinois, Indiana, Wisconsin and Michigan. In northwest Indiana, the cattle were mostly tuberculin tested, and in Wisconsin about half were. The result was that Illinois, from whence came the larger part of the city's milk, was becoming the "dumping ground" for the reacting cattle of the adjoining States, and as a consequence it was estimated that thirty per cent. of Illinois cattle were tuberculous. Moreover, the city had no ice ordinance in reference to the transportation of milk, and in the summer months it arrived in the city at a temperature of from 70 to 80 degrees. Then, there was the question of price. Chicago citizens refuse to pay more than seven cents a quart for their milk and some only six. Pasteurization helps to keep the price down.

Up to August, 30,000 of the 120,000 cows supplying Chicago had been tested, furnishing 7,000 eight-gallon cans out of the 30,060 eight-gallon cans used each day. Of the balance, 18,000 cans are pasteurized and 5,000 cans are sold in defiance of the city law. The milk comes from 12,000 farms within a radius of sixty miles. In the working out of the tuberculin test difficulties had been met with—the dishonest veterinarian, the farmer who would hustle a reacting cow into a neighboring herd and demand that it be retested so that it would not react—and it was found more easy to enforce and control pasteurization than tuberculin testing.

INFANT MORTALITY DECREASES; DIARRHOEAL DISEASES INCREASE.

"Publicity is one of the very best agents you can have," remarked Dr. Evans, and one of the very excellent publicity adjuncts to the Department of Health is a four, six or eight page "Bulletin," issued each Saturday by the Chicago School of Sanitary Instruction. It is distributed free, and through it the Department disseminates advice and information on health matters. Its motto is the words of Earl Derby: "Sanitary instruction is more important than sanitary legislation." It gives each week an analyzed statement of the mortality of all ages and all causes for the previous seven days, and it showed that during the week previous to the visit of your Commission the total deaths under one year of age had been 194, as compared to 181 during the same week of the previous year, an increase of 13. The deaths from diarrhoeal diseases numbered 167 under two years, being 23 higher than the same week last year. Similarly during the week following the deaths under one year increased from 189 to 208 and those from diarrhoeal diseases from 196 to 209.

It would be unfair, however, to cite the two hottest weeks of August as a criterion. A better criterion is found in the complete figures for the nine months ending September 30th, and these show a gratifying decrease in the deaths under

one year to the extent of 466. But, unfortunately for any theories, consideration must be given to the somewhat curious fact that in spite of this splendid decrease in infant mortality, the number of deaths caused by diarrhoeal diseases, which are usually attributed to feeding, actually increased by 44 in infants under two years of age.

In even surmising the influence of the milk supply on infantile mortality, it must also be noted that during the summer months the Medical Milk Commission maintains stations at which clean, pure, wholesome milk may be obtained at a price below cost. As for tuberculosis, this disease is so slow in its progress that it will be impossible to make any comparisons for another year at least.

STANDARDS OF PASTEURIZATION.

In view of the varied opinions even among experts as to what constitutes proper pasteurization, attention was given to the Chicago view on this point. "What is the test of the effectiveness of your pasteurization," was the question asked Dr. Evans. "Results are the test," was the reply. By this Dr. Evans referred to the ordinance which provides that milk must be "raised to a temperature sufficient to kill 99 per cent. of the bacteria and all of the pathogenic germs (disease carrying bacteria) contained in the raw product." This is somewhat general inasmuch as the Department does not specify precisely what constitutes the "required amount" to kill 99 per cent. of all bacteria and all the disease producing germs. An effort is made to enforce this provision by frequent inspection of the pasteurizing machines, which must be equipped with a recording apparatus to show the temperature at which milk is exposed and the length of time. Then, bacteriological examinations of the milk are made to ascertain how many germs remain after pasteurization, the ordinance providing that there shall not be more than 100,000 per cc. in summer and 50,000 in winter. The fact was, however, that, with a few exceptions the pasteurizing machines in use in Chicago dairies were those known as "Continuous"—a high temperature for a short time. The bacteriological count showed, not that the idea of the ordinance was being realized, but that the count of pasteurized was very, very much less than unpasteurized. In the hot weather of an August week for instance, samples of pasteurized milk went up to 20,000,000 per cc., while raw milk went over that number. The average, however, for the samples of pasteurized was 1,518,837, and that for the raw 6,214,500. Later, in the cooler weather of a September week, the average for pasteurized milk was 849,957, and for unpasteurized 4,897,257. These samples were taken on the street and the figures are given herein for what they are worth. The nature of the bacteria of course is not stated, but experts agree that the harmless, if not helpful, lactic acid germs succumb first to heat.

PASTEURIZATION ORDINANCE.

The exact text of the pasteurization ordinance is of interest and is as follows:

Rule 6. (Pasteurizing Temperatures.) All pasteurized milk, cream, skimmed milk, milk products, and milk and cream used in the production of milk products shall be pasteurized in accordance with the following regulations:

(A) (Continuous Pasteurization.) In all continuous pasteurization the milk and cream shall be heated to a temperature which shall be determined and fixed by the Department of Health for each machine at a point corresponding to the temperature required to kill 99 per cent. of the bacteria and all pathogenic bacteria

contained in the raw product. For this determination ordinary raw milk containing in the neighbourhood of 3,000,000 bacteria shall be used and the pasteurized product shall be collected as it flows from the cooling apparatus.

All continuous pasteurizers shall be equipped with a feeding pipe which is so constructed that the pasteurizer cannot be fed in excess of its normal working capacity; that is, in excess of the working capacity of the machine at which 99 per cent. of the bacteria are killed when the required amount of heat is applied.

All continuous pasteurizers operated outside of the city limits, for the production of pasteurized milk and milk products to be sold in the city of Chicago, shall be equipped with an apparatus regulating automatically the supply of steam and heat, so as to correspond with and produce the required temperature of the outflow of the pasteurized product. These automatic thermo-regulators shall be accurate and must be approved by the Commissioner of Health before being installed.

A recording apparatus shall be installed upon all continuous pasteurizers operated within the city limits so as to record during operation the temperatures of the pasteurized product as it flows from the heater. The thermometer of this recording apparatus must be accurate and kept emerged in the milk in such a way that it is not exposed to escaping steam or other heat, except the heated milk.

The records made by this recording thermometer must be accurate and made in a chamber which is kept under lock and key in the control of the Department of Health.

The automatic thermo-regulating and recording apparatus may be combined into one instrument and it is recommended that all pasteurizers be equipped with both appliances or combination apparatus.

(B) (Held Pasteurization.) Whenever milk is held during pasteurization in such a manner that the process of pasteurizing is not a continuous one, namely, a continuous flow of milk through the heating or heat-retaining chamber, the process shall be designated as "Held Pasteurization." Such methods of pasteurization and pasteurization appliances or systems installed and used shall be examined and approved by the Commissioner of Health, or his duly appointed representatives, when all of the following requirements are fulfilled:

1. When the pasteurized product shows that over 99 per cent. of the bacteria and all pathogenic bacteria contained in the raw product have been destroyed.

2. When the mechanism of the pasteurizer or pasteurizing system is such that the three important elements, namely: the temperature, time of exposure, and the quantity of milk exposed at one time, can be readily kept under control and observation by the Department of Health.

3. When the following conditions are complied with:

A uniform heating of 140 degrees F., maintained for 20 minutes; 150 degrees F., maintained for 15 minutes; 155 degrees F. maintained for 5 minutes; 160 degrees F., maintained for 1½ minutes; 165 degrees F., maintained for 1 minute.

The time shall be calculated from the period that the entire quantity reaches the required temperature.

Rule 7. (Cooling Temperatures.) The pasteurized product shall be cooled at once to a temperature of 45 degrees F. or less. This cooling shall be so conducted that the pasteurized product is not exposed to the air or other contamination. This cooling apparatus shall be so constructed that it can be readily cleansed and sterilized.

PROF. HEINEMANN'S VIEWS.

One of the eminent authorities of Chicago on the question is Prof. P. G. Heinemann, Ph.D., of the Bacteriological Laboratory of the Chicago University, and your Commission had the great advantage of an interview with him. He believes the advantages of pasteurization, when properly performed, outweigh the disadvantages. He said: "In my opinion, continuous pasteurization at 165 degrees is of little use, as the disease germs are not killed and the lactic acid producing germs, which are useful in keeping down the putrefactive bacteria, are killed. As the lactic acid bacteria are destroyed, in that degree the development of the putrefactive bacteria increases. For infants I would prefer to use clean milk not pasteurized, as our knowledge up to the present does not permit us to express a definite opinion in regard to the exact changes through pasteurization. Figures also prove that some cases of scurvy and rickets were developed through pasteurized milk."

Prof. Heinemann further referred to an address recently delivered on the question of sanitary milk, in which he spoke of treating milk by heat, and expressed this view:

"From a bacteriological point of view, however, the disadvantages of treating milk by heat are more pronounced after pasteurization than they are after sterilization. The vegetative forms of bacteria escape destruction to a larger degree and spores are probably not influenced at all, so that putrefaction sets in very readily. I should, therefore, not consider pasteurized milk fit for consumption after a lapse of twenty-four hours. The products of these spores after germination, as established by Flugge, are more or less poisonous to animals.

I do not wish to depreciate the value of pasteurization if properly executed. The one great advantage remains, and that is the security from pathogenic bacteria. But in how many cases do we obtain pasteurized milk which is properly treated? I have seen a pasteurizer at work in a large dairy, the milk of which escaped at a temperature of slightly above 120 degrees F., and when asked for an explanation the proprietor informed me that the proper temperature of 165 degrees would be reached in a few minutes. Admitting, then, that the bulk of the milk has been pasteurized still a small part of it has not been pasteurized, and this contains nearly the original number of bacteria, which, since milk is an excellent culture medium for bacteria, will multiply at an extraordinary rate. Not only this, but, as stated before, the lactic acid bacteria, being very sensitive to heat, have undoubtedly been largely destroyed, giving the putrefactive bacteria full sway. Such milk may retain its sweet taste and clean, good appearance for a number of days, but may harbour deadly poisons, which are especially harmful to the delicate digestive tract of the infant. These disadvantages of pasteurized milk were readily recognized among scientists and substitutes were devised, among which I may only mention the co-called formalinized milk of Behring, the peroxide milk of Much and Romer, and others, the application of which, however, has been by no means satisfactory."

A QUESTION IN POLITICS.

It has already been stated that the question was still in the experimental and still in politics. Something of the practical side of the experiment has been set forth, and as to the political side it may be said that it is in both municipal and state politics. More strictly speaking, the pasteurization is in municipal politics, and the tuberculin testing is in state politics. A milk dealers' association, said to

be composed chiefly of small dealers, is keeping up an agitation for the repeal of the ordinance and some of the aldermen are working in that direction.

In the Illinois Legislature, Hon. Edward D. Shurtleff, who is Speaker, and who represents what is known locally as a "cow country," is regarded as the leader in the question. To your Commission Mr. Shurtleff said: "The Legislature has appointed a Committee to enquire into the question of the tuberculin test from every standpoint. The Committee met and elected me chairman, but as we do not have to report until the fall of 1910, we decided that beyond collecting the laws of the various states on the question, we would not do much until after a trial which comes on in Montclair, New Jersey, in the spring. Montclair has a mandatory tuberculin ordinance and I understand the Borden Company, one of the largest dairy companies in the United States, is contesting their right to pass such a statute. I am informed that the question is to be taken up very thoroughly by both sides as a test case, and experts are to be summoned from all parts to testify both as to the legality and to the utility of the tuberculin test. It is anticipated that a mass of authoritative evidence will be submitted and we are watching the outcome. Personally, I do not think the day will ever come when the tuberculin test will be supreme, but we may come to a law of the physical test. The difficulty with the tuberculin test is that some of the worst cases do not react, while a case of mere infection would react although there was no possible chance of injury to the milk supply. It is also said there is no tubercle bacilli in the milk unless there is tuberculosis of the udder or generalized tuberculosis."

STATE BOARD OF HEALTH OPPOSES.

Opposition to both pasteurization and tuberculin testing comes also from the State Board of Health.

In December, 1908, just before the pasteurization ordinance went into effect in Chicago, what was apparently the official view of the Illinois State Board of Health was voiced in a lengthy article by their Secretary and Executive Officer, Dr. James A. Egan, published in the Monthly Bulletin issued by the Board. He first attacked "commercial pasteurization" as ineffective and a device of dirty dairymen to keep milk from souring. He secondly attacked any kind of pasteurization as being injurious to the nutritive qualities of the milk, making it specially injurious to infants. In support of both he quoted eminent authorities, including Von Behring, the eminent exponent of the theory of the transmissibility of bovine tuberculosis to man. In the third place, he disputed the efficacy of pasteurization to kill the tubercle bacilli, and in this connection he adds the following:

"We believe that the greater portion, if not all, of the milk sold in Paris undergoes pasteurization; but the death rate from tuberculosis in Paris—in children and adults—is greatly in excess of that in Chicago, where infants are generally fed raw milk. The ratio of deaths from all forms of tuberculosis to deaths from all causes is 1 to 4 in Paris, and 1 to 8 in Chicago. In other words, Paris, with a complete system of pasteurization has double the mortality from tuberculosis of Chicago, where pasteurization is exceptional; and yet pasteurization is advocated as a prime means of preventing the spread of tuberculosis.

The following table furnishes information of decided interest and value in this connection:

DEATH RATES FROM TUBERCULOSIS IN PARIS AND CHICAGO.

Rate per 100,000 of population.

Year.	All forms.		Pulmonary.		Abdominal.	
	Paris.	Chicago.	Paris.	Chicago.	Paris.	Chicago.
1901	466.8	168.1	401.6	147.5	6.7	5.1
1902	459.6	165.7	393.8	147.0	7.8	5.6
1903	457.0	182.2	387.2	158.1	7.6	6.3
1904	451.4	184.8	385.7	163.9	8.7	6.2
1905	448.1	185.7	381.8	162.8	8.3	6.4
1906	448.6	187.1	378.2	158.4	8.7	6.2

CHILDREN UNDER FIVE YEARS OF AGE.

Rate per 100,000 population of same age.

Year.	All forms.		Pulmonary.		Abdominal.		Meningeal.	
	Paris.	Chicago.	Paris.	Chicago.	Paris.	Chicago.	Paris.	Chicago.
1901	592.9	112.1	174.6	49.6	15.2	9.7	360.3	43.5
1902	592.3	77.3	164.6	35.9	18.2	8.4	380.2	27.9
1903	597.6	113.5	183.4	43.8	15.2	8.2	362.6	50.1
1904	553.6	104.2	152.3	42.8	16.4	13.3	351.5	39.0
1905	519.6	116.7	134.2	39.5	14.6	10.7	341.5	56.7
1906	568.9	117.6	154.1	44.0	17.6	10.4	366.7	46.8

Dr. Egan maintains that "through inspections of dairies and farms and sanitary supervision of dairy herds, any city can procure a good milk supply," and he concludes by characterizing pasteurization as an "unreliable remedy for an uncertain danger."

STORES MUST SELL IN BOTTLES ONLY.

Although thus far consideration has been given only to pasteurization and tuberculin testing, it must not be thought these are the only features of Chicago milk laws. In fact, Chicago ordinances include all those features which modern thought regards as essential in safeguarding the milk supply of a great city. And they have one regulation not found in many other cities, and it provides that no milk or cream may be sold in stores where other merchandise is sold unless it is "kept and sold in tightly closed and capped bottles or receptacles of a similar nature such as shall be approved by the Commissioner of Health." This was passed on June 22, 1908, and the object is to prevent the contamination to which bulk milk is exposed. It is described by the Health Department after a year's experience as "one of the very best ordinances we have."

The Department maintains ten inspectors in the city and eight among the farms in the country. During 1908, dairy farms to the number of 9,707 were

inspected and milk from 390 was excluded from Chicago on account of unsanitary conditions and from 50 on account of contagious diseases on the premises. Of 860 cows tested in the city, 7.2 per cent. reacted.

The sanitary standard of milk must come up to the following conditions:

Must not have more than 1,000,000 per cc. on arrival in city from May to September, or 500,000 the balance of the year;

Must not have an "excessive number" when delivered to consumer;

Must not have any tubercle, typhoid, diphtheria or other pathogenic germs;

No milk containing over 3,000,000 per cc. shall be sold and any dealer whose milk exceeds this on three successive counts shall be prohibited selling until the method of production and handling shall have been regulated by the Department;

Milk is not considered sanitary if a quart, well mixed, strained through a piece of white linen cloth four inches square, shows any perceptible sediment.

CHAPTER V.

Being a Statement of the Regulations Governing the Milk Supply of Copenhagen, said to have the best Milk Supply in the World, and a Review of the Ideal Company Regulations of one of the Largest Dairy Companies in the World.

In view of the fact that Mr. C. C. James, Deputy Minister of Agriculture, was making a visit to Great Britain and Europe during the past summer in the interests of agriculture, he was asked by your Commission to make enquiries into the milk question. In response to our request, he looked into the matter in Copenhagen and London and submits the following chapter which we beg to present for its educational value:

"Denmark has become during the past twenty-five years the most noted dairy country of the world. Special attention has been given to the breeding and feeding of dairy cattle; to the care and handling of the milk, and the production and marketing of dairy products, especially butter. Special attention has been paid to the prevention and cure of tuberculosis. Prof. Bang, the most noted authority on the treatment of tuberculous cattle, is a Dane and his methods are thoroughly carried out by the farmers of Denmark. It might be expected, therefore, that Denmark would offer a good example of the production, care and handling of milk for human consumption. The city of Copenhagen has, I believe, the best general supply of milk of any city of the world, and the retail price of milk is 5 to 5 1-2 cents per quart. Its population is 375,000. The total population of Denmark is 2,450,000, about 300,000 less than Ontario. Its area is 10,000,000 acres, a little more than the total area of field crops in Ontario. This little country, with a population somewhat less than Ontario, exports annually approximately \$90,000,000 worth of butter, bacon and eggs, of which \$80,000,000 worth goes to Great Britain.

First of all I give you the city sanitary regulations under which milk may be delivered to and sold in the city of Copenhagen. This is followed by a brief and simple statement of the operations of the Trifolium Dairy Company and the regulations under which this company carries on its work.

I might state that the documents used in this report were in Danish and I had them translated for the use of the Ontario Milk Commission by Mr. J. F. Hansen, a well informed Danish gentleman who resided for a time in Canada.

SANITARY REGULATIONS.

City of Copenhagen.

Rules Governing the Sale of Milk, etc.

Section 1.

All vendors of milk and persons engaged in the transport of milk destined for sale in Copenhagen are subject to the control of the City's Health Committee and must strictly observe the rules laid down in the present Order.

Section 2.

Any firm or person desirous of carrying on business as vendor of milk in the city of Copenhagen must prior to starting operations give notice of such intention

to the Health Committee (City Police). Such notice must also be given in the event of removal of business or establishment of branch depots.

Section 3.

Owners of milk cows in this city must from the date of this Order give notice to the authority above mentioned of any outbreak of contagious disease among their cattle. They shall also follow closely any regulations which the said Health Committee may issue in respect of cow keeping, etc., in addition to those laid down in the present Order.



Interior of Copenhagen Dairy.

Section 4.

Dealers may sell milk only under the following descriptions, viz.:

(1) Fresh Milk, (2) Half Skimmed Milk, (3) "Skimmed Milk," and "Children's Milk," (as hereinafter stated).

As "fresh milk" only such milk may be sold which has not in any manner been deprived of its natural properties, and it must contain at least 2.75 per cent. of fat. Milk containing any addition of half skimmed milk or skimmed milk is strictly barred from being sold as "fresh milk" even if it contains a percentage of 2.75 fat or more.

It is permissible to sell milk which has been partially depleted of its fat substance as "skimmed milk."

The term "half skimmed milk" may be used if the percentage of fat which it contains amounts to at least .75 per cent.

Section 5.

In addition to above, it is permissible to sell as "children's milk" such fresh milk which in addition to satisfying the rules of Section 4, has been cooled down to 53.6 degrees F. or lower and the fat percentage of which amounts to at least 3.

Further, "children's milk" must be drawn from cows which have:

- (a) Not longer than 12 months since withstood the tuberculin test successfully and
- (b) Been certified within any 15 days by the Veterinary Surgeon of the Health Committee as being equal to such requirements in respect of feeding and general treatment, as the said Committee may from time to time deem necessary.

Dealers in "children's milk" must henceforth satisfy the Health Committee as to the origin of such milk, and if called upon, produce a certificate of the Committee's Veterinary Surgeon that the conditions mentioned under (a) and (b) have been complied with.

In the event of the said Committee not finding the Veterinary Surgeon's certificate satisfactory, the Committee has power to instruct the dealer concerned to carry out such improvements as they may find necessary to secure the observance of above regulations.

Printed certificate forms are obtainable at the offices of the Health Committee.

Section 6.

Fresh, half skimmed, and skimmed milk, also pasteurized milk, must, in addition to satisfying all regulations mentioned in Section 4, be heated to 185 degrees F. and immediately afterwards cooled down to 46.4 degrees F. or lower. Sterilized milk cannot be sold unless the sterilizing process has been approved of by the Health Committee.

Pasteurized and sterilized milk may be sold only in air-tight vessels of clear, slightly colored glass. The date on which the sterilizing or pasteurizing process took place must be clearly stated on the label, together with the name and address of the vendor or sterilizing institute.

All bottles prior to being filled must be cleansed in strong soda or lime water solution or must be sterilized.

Section 7.

It is permissible to sell "mixed milk" for children in bottles. In respect of this milk, all regulations stated in Section 5 apply. This milk may be mixed with sugar and water, but full details as to the composition must be clearly printed on the label.

The mixture must also be pasteurized.

Section 8.

Buttermilk, Curdled Milk, etc., must be described as such when sold.

The description must also always be given of milk of other animals than cows if sold by any vendor.

Section 9.

All milk must be strained through a close sieve immediately after milking and it must be treated with every care and cleanliness. The responsibility as to observation of this rule rests not only upon the producer but also on the importer and seller.

All vessels and appliances which come into contact with the milk must be kept in a clean condition.

Section 10.

The sale is prohibited of milk

- (a) Which in respect of colour, smell or appearance differs from the ordinary quality of good milk;
- (b) From cows which have recently calved and whose milk is consequently not yet fit for use;
- (c) From cows which have been proved to be infected with Tuberculosis, Hypochondriasis, Hydropsy, Garget, Mouth and Foot Disease, Pox, Diarrhoea or any and all fevers or diseases of any kind involving internal or external medical treatment which in consequence may have unfavourable effects on or cause damage to the quality of the milk; or



The thrift of the Danish farmer is illustrated in tethering cows at pasture.

Milk mixed with water or with any substance used for preserving, such as Aseptic, Salicylic Acid or similar chemicals which the Health Committee may consider as calculated to have an injurious influence, or any other foreign substance, except those mentioned in Section 7; or

Milk containing any kind of dirt or showing, after standing for two hours, a sediment, will be regarded as impure.

To secure the proper observance of these regulations, the Health Committee may at any time call upon dealers to disclose the origin of any milk sold by them and to demand production of a veterinary surgeon's certificate twice monthly, giving particulars as to condition of the herd, treatment and feeding of same, and such certificate must always be drawn up in accordance with the ordinary rules of the Sanitary Committee.

Section 11.

All vessels containing any of the qualities of milk named in Section 4 hereof and from which milk is measured out and sold to customers, should bear inscriptions with fullest description of the kind of milk sold in lettering of at least one inch in size, and all such vessels should be as far as possible exhibited in such a manner that they are visible to the public.

Bottled milk should always be sold in clear, slightly coloured glasses. Descriptions of the contents and name and address of dealer should be visibly printed on a label, which must be safely fixed to the bottle, or the foregoing particulars may be impressed on the stopper.

Other descriptions of milk than mentioned in this Order are prohibited to be used on vessels, bottle labels or advertising posters, unless special permission has been granted by the Health Committee.

In transporting milk to this city and for storing it, it is not permissible to use vessels or measures made of wood, unpolished copper, brass or zinc or vessels covered by rust or vessels covered by lead or damaged and having cracked enamel or being in any other condition likely to cause the milk in any way to be rendered impure.

All milk transport cans should have well closing lids which must be fastened to the can by a chain. The measures used should have a handle to avoid the milk being touched by the hands of any person handling it. Milk transport cans must under no circumstances be used for any other purpose. For tightening the lids of milk cans paper must not be used, neither gutta percha or any other impure substance. Gauze or leather if used for this purpose may only be used once.

In the event of milk being transported on carts, which also carry yeast or kitchen offal, then such substance must only be carried in locked vessels.

It is not admissible to transport milk or transport cans intended for milk together with manure or in carts which have previously been used for conveying manure prior to such carts being properly cleaned.

Section 12.

Premises in this city used for the sale or storage of milk should daily be thoroughly aired and cleaned.

If the floor of any such premises consists of boards, not covered by linoleum or other covering preventing the percolation of moisture, then such floors must be varnished and the rifts filled with putty. The floor should be scrubbed and cleaned daily and once per week all floors, walls, doors and panels should be thoroughly cleaned and windows polished.

Where walls and ceilings are not made of marble or other kind of stone or of glass or are oil painted, they should be painted white or whitewashed at least four times per year. With reference to walls and ceilings which can be washed, this is required to be done at least four times per year.

No dry dusting must take place in these premises. All premises in which milk is either stored or sold must contain a number of water spittoons.

Along with milk it is permissible to deal only in the following goods, viz.:

Bread, cakes, flour, butter, margarine, lard, eggs, soda water, beer in bottles, sweets in glass bottles, chocolate and fruit juice in bottles.

In respect of retail business which on May 1st, 1904, dealt in milk and cream and also in goods other than those enumerated above, the Health Committee has power for the lifetime of the owner and if necessary his widow to allow such busi-

ness to be continued, but only so long as the business is carried on in the same place or in its immediate neighbourhood, but the Committee may always exclude any goods to be sold on these premises which in their opinion should not be stored jointly with milk.

A laundry or similar business may not be carried on with a milk business.

The premises where a milk business is carried on may not be used as living or sleeping quarters or be in direct connection with premises used for living or sleeping, except where such premises are connected with the sale rooms by a firmly locking door which must not be left open.

Cellars not draining into the main sewer must not be used.

The regulations contained in this paragraph do not apply to such premises where milk is exclusively sold in sealed and air-tight bottles and where no bottling and mixing of milk takes place.

Section 13.

Should any person employed either in connection with milking, sale or mixing of milk or any persons who live on premises adjoining the sale rooms for milk, show any symptoms of disease which may lead to some contagious fever such as typhoid, scarlet fever, diphtheria or any other throat disease, spinal inflammation, diarrhoea or any other contagious disease, and lung tuberculosis, a medical man must immediately be called in, and if the latter so determines, notice must be given to the Health Committee, which can insist upon the patient being moved from the premises.

No person suffering from a skin or similar contagious disease or from sores or wounds on head or face or persons being in any manner connected with individuals so afflicted, may be employed in milking or handling milk in any way. Cleanliness with reference to dress and person must be observed by everybody employed in the milk business.

Section 14.

Not only the individuals concerned will be held responsible for the observance of any personal rules herein contained but also principles, both milk producers and sellers. Except in cases where milk is sold in sealed bottles, the seller is personally responsible for the quality of the milk sold on his premises.

Section 15.

A copy of these Rules must be exhibited in a prominent place in each milk sale room. Department 3 of the City Police will furnish printed copies free of charge.

Section 16.

The Rules stated in Section 12 (as to interior of premises) will come into force 12 months after publication of this Rule, all other regulations six months from that date.

THE TRIFOLIUM DAIRY COMPANY.

The Trifolium Dairy Company (Trifoliums Mælkeforsyning) or The Danish Estates Butter Factory as the name reads upon its delivery waggons, was organized in 1898 for the purpose of manufacturing butter and cheese for export to England.

In 1901, a dairy was opened in Copenhagen for supplying milk to the city. The head office is in Copenhagen and Mr. J. G. Smith is the General Manager. In addition to the Copenhagen dairy, there are four branches. Three thousand cows supply the milk to the Copenhagen dairy and ten thousand cows supply milk to the four branches. Forty carts or waggons start out every morning between 5 and 5.30 to deliver milk. In addition to the driver, there are six boys to each waggon for distributing the milk, all of which is bottled. 25,000 bottles are delivered, each holding one litre of milk (one litre equals .88 quart). The milk is brought in by rail, most of it coming 60 miles. It is delivered right at the dairy every night between 10 and 12 o'clock. The evening and morning milk are kept in separate cans labelled. It is cooled at the farms to about 46.4 degrees F., and when received it stands at about 60.8 degrees F. First of all at the dairy it is cleaned by passing through a separator run at 700 revolutions per minute (4,000 to 5,000 revolutions would separate the cream). The cleaning is at the rate of 2,500 litres per hour for each machine. Then it is cooled to 35.6 to 37.4 degrees F., bottled and sealed and is ready for delivery. There are five bottling machines, each of which fills 1,000 bottles per hour. When the drivers return, any milk left unsold is separated and the cream made into butter. The skim milk is pasteurized. The milk sold is not pasteurized. Mr. Smith does not believe pasteurizing is necessary in their methods of producing and handling the milk. The bottles returned are cleaned by machinery. First they are washed in cold water, then in water at 149 degrees F., and afterwards with water and soda. Five machines each clean 1,000 bottles per hour, so that it takes five hours to clean up the whole supply of 25,000 bottles.

While the general executive business of the company is in the hands of the manager, the general supervision of the work and the inspection of all the operations are in the hands of a Control Committee consisting of two persons. At the time of our visit the members of this Committee were Mr. C. O. Jensen, Professor of the Royal College of Veterinary Surgeons of Copenhagen, and Dr. Schierveck, Lecturer at the University (a Doctor of Medicine). The herds are under systematic inspection by the Company's Veterinary. The following regulations set forth in general terms the responsibilities and duties of the Committee, the Veterinary, and the main regulations under which work is carried on.

A.

1. Milk sellers must covenant to allow their herds to be inspected as often as the Company considers it necessary, by their veterinary surgeon, and to give such surgeon any information respecting the herd, and methods of feeding and milking. Milk sellers undertake to carry out any orders given by the veterinary surgeon.

2. Any cattle described by the veterinary surgeon as being infected with tuberculosis must immediately be separated from the remainder and slaughtered, or disposed of, as quickly as possible. Cattle that for other reasons are set aside by the veterinary must, according to his instructions, either be removed entirely from the stable or put up at the other end of same. The milk must not be delivered, and they must not be put back into the herd until leave has been granted by the veterinary.

3. In the event of cattle becoming diseased between two visits of the veterinary, milk sellers covenant immediately to separate animals, especially if tuberculosis, inflammation of udders, milk fever or acute diarrhoea occur, and in such case retain the milk from such cows and to inform the veterinary. Any milk so retained will in such case be paid for until the veterinary's opinion has been given. In the event

of many cases of disease which might be due to a contagious outbreak or to poisoning, occurring in the herd, the veterinary or the manager of the Company must be informed by telephone or telegram.

4. The milk of newly acquired cows must not be delivered until they have been inspected and passed by the veterinary.

5. Suppliers of "infants' milk" must covenant not to put any cows into the herd until these have been tested by the tuberculin test and have been declared as sound by the veterinary. All cows in the herd may, in the event of it becoming desirable, be marked. Suppliers covenant to allow the herd to be vaccinated with tuberculin at least once per annum. The lists, giving the result thereof, must be forwarded to the Company's Committee by the veterinary. In the event of a cow or more reacting on tuberculin test, the seller agrees to dispose of such cow or cows immediately and to see that such cow or cows do not mix with the other part of the herd.

B.

Health of the Staff.

6. Suppliers undertake to maintain the following rules respecting their staff:

- (a) No persons suffering from tuberculosis or syphilis may be on the staff, whether employed in the stables, milking or otherwise.
- (b) Persons suffering from growths or sores on the face or on the hands or arms or from skin diseases or acute diarrhoea must under no circumstances come into contact with the milk.
- (c) Persons in whose household such diseases as typhoid, gastric fever, diphtheria, scarlet fever or any other infectious disease has broken out must under no circumstances come into contact with the milk, until the local doctor has declared them free of infection. In the event of them having come into contact with the milk such milk must be kept back and this milk will be paid for by the Company, provided that the seller of the milk has not been guilty of carelessness.
- (d) Suppliers agree to watch carefully over the health of their employees and that in the event of any infectious disease amongst them they shall be immediately isolated.
- (e) Twice a year, shortly after the 1st of May and 1st of November, a certificate must be sent from the farmer's medical man to the Company as to the condition of health of his staff, with particulars of any cases of disease which have occurred in the past half year and which have been attended by the doctor.

7. In the event of an outbreak of typhoid on any farm or of gastric fever, diphtheria, scarlet fever or any other serious contagious disease amongst persons living there or amongst people working on such farm the latter agrees immediately to telegraph or telephone to the Company's Manager. In such case the milk from the herd must not be delivered to the dairy until the Committee agrees to it. For any milk so kept back the Company agrees to pay the full price.

C.

Feeding of Cows and Treatment.

8. All food supplies must be quite fresh. Mouldy or otherwise damaged fodder must not be kept in the stable or in the immediate neighbourhood. The Company's veterinary surgeon has the right to inspect the stock of food.

9. In the summer the cows must, as far as possible, graze in the fields. If it is necessary to feed them in the stables, the Company must be advised thereof and the milk seller agrees in such case to keep the cows and the stables in a very clean condition. The Company reserves the right, if necessary, to forbid cows being kept in the stables if the milk of such cows is sold as "infants' milk."

10. The composition of fodder must be communicated to the veterinary surgeon.

The following rules must be observed:

- (a) Of the turnip class, carrots and beets must be used for cows whose milk is intended for "infants' milk" and of this not more than, at the outside, 40 lbs. per cow per day.
- (b) For cows from whom "infants' milk" is not drawn, 60 lbs. of such fodder may be supplied per day, but only so long as cows do not suffer in any way therefrom.
- (c) Turnip leaves, beet leaves, or cabbage leaves must not be fed.
- (d) Cows intended for "infants' milk" must not be given molasses, cotton seed cakes, green or dry buckwheat or mustard. Other cows may be given this class of fodder only in small quantities. Molasses must be discontinued in the event of it bringing about any trouble of any kind. Cotton seed cake must not contain any considerable quantity of mustard and these cakes must be submitted to the veterinary before being used. In case of serious mistakes being discovered on the part of milk suppliers, with regard to the composition of food, they must agree to rectify the same according to the Company's suggestions.

11. Milk suppliers must, as far as possible, avoid frequent alterations in their composition of fodder.

12. Before the cows are returned to the stables in the fall they must be shorn at the dugs, tail and shanks.

13. It is forbidden to supply milk until after 10 days after calving or to supply milk from cows that yield less than 6 lbs. per day.

D.

Handling the Milk.

14. The milking must be done in the cleanest possible manner and with care. The following rules must be observed:

- (a) The persons who milk must wear a suitable dress and apron. There must be a supply of plenty of clean water so that they can wash their hands frequently.
- (b) The stables must be sufficiently lighted during milking, especially behind the cows, so that the persons who do the work can see to carry it out in an orderly and clean manner.
- (c) Immediately after milking the milk must be strained through a clean metal sieve which must frequently be cleaned.
- (d) The milk must, at all times of the year and immediately after milking and until being sent to the Company, be cooled by the cooling apparatus to about 50 F.
- (e) The cleaning out of stables must be undertaken in the morning after the milking and in the afternoon it must be finished before the milking begins.

- (f) Cows which yield less than 6 lbs. milk per day and cows which have been rejected by the veterinary surgeon must be kept apart at one end of the stable in such a way that the milk from such cows cannot possibly be mixed with that from those to be delivered.

15. A sufficient supply of ice must be kept. A cooling apparatus must be used, and must be stationed in a light, clean place that has not been used for any other purpose and which, prior to the cooling taking place, must be cleansed with clean water.

16. The milk suppliers agree to follow the instructions of the Company and its veterinary surgeon as regards any points of cleanliness or handling of milk.

E.

Delivery.

17. In the summer the transport cart must be supplied with a cover to protect the cans from the sun. Fodder in racks, or manure, may not be transported on the same conveyance as the milk, or cleaned cans returning from the dairy.

18. The Company supplies the milk cans. The milk cans used for "infants milk" must not be used for any other purpose. Under no circumstances must these cans be used for anything but for the delivery of milk.

All cans are sent back by the Company in a clean condition.

19. The milk suppliers must clean the cans again in clean cold water, and any dirt which may have accumulated during the transport must be removed.

20. Milk suppliers agree to see that good water is supplied to the cows for drinking and for cleaning of any articles which come into contact with the milk. Milk suppliers also agree to comply with any suggestions as to improving the water supply which may be pointed out to them by the Central Committee.

F.

Sundry Rules.

21. Milk suppliers agree on their word of honour to answer all questions from the Company with reference to the supply of milk.

22. The herds and the premises where the milk is being handled and kept are at all times open to inspection on the part of the members of the Company's Committee of Control.

FILTRATION PLAN AND INFANT FEEDING.

In addition to The Trifolium Dairy, there are other companies engaged in the business of supplying milk to the citizens of Copenhagen, which, of course, are working under the city regulations set forth on a previous page. Among these may be particularly mentioned the Copenhagen Milk Supply Company, an interesting account of whose operations was set forth in *The Scottish Farmer*, of August 21, 1909, by Mr. John Porter. As this was written at the time of my visit to The Trifolium Dairy and was based on an inspection made about the same time, a few references will be appropriate. Mr. Porter states that the Danish Milk Supply Company also follows exactly similar lines. The writer states that "In no other town or city that the writer has visited has the quality of the milk been so generally satisfactory."

"The Copenhagen Milk Supply Company has never gone in for pasteurization, as it was considered unnecessary, provided the milk came from healthy cows, and was carefully handled throughout."

While, in the main, all these Copenhagen companies have the same inspection and supervision of the cows, and adopt the same methods of bottling and of carefully cleansing utensils, there are two things in connection with the Copenhagen Milk Supply Company that should be noted. The first is the filtration of the milk. After being delivered to the city receiving station, the following process of filtration is adopted:

"The milk is then passed through a filter with three wire gauze sieves, between two of which is a layer of cotton wool. After this, it is again passed through a gravel filter. This consists of two receptacles connected by a pipe, and one at a slightly higher level than the other. The lower receptacle contains layers of fine gravel, separated by perforated zinc plates, in addition to several layers of muslin. The milk poured into the receptacle at the higher level gradually rises through the gravel filter by upward filtration and is conveyed away to the bottling room. The amount of sediment which is removed from apparently clean and well-handled milk is rather surprising. The gravel is taken out daily and boiled in a solution of water and soda, and then thoroughly sterilized by steam. When the gravel is properly dry the dust collected during filtration is removed by fanners, and the gravel is ready again for further use."

Mr. Busck, the manager of this company, makes a specialty of milk for infants. In addition to providing separate milking premises and the taking of extra care in the brushing of the cows, a pail of peculiar construction is used. Mr. Porter describes it as follows:

"In the milking room the milkmaid, in a clean white dress, first wipes the cow's udder with a damp cloth. She then washes her hands prior to milking, and milks the first few jets from each teat into a separate pail. The remainder is then milked into a Busck pail, in the bottom of which is a pear-shaped copper receptacle projecting into the can. This receptacle is previously filled from below with a mixture of one part salt and three parts snow or ice, the idea being that, as milking is proceeding, each jet of milk, as it strikes this cold projecting ball, will be deprived of its animal heat, and micro-organisms, which may have got into the milk during milking, will have less favorable conditions for developing than if the milk were allowed to retain its animal heat. This milk is not passed through the gravel filter, but instead is put through the special cotton-wool filter again, previous to being bottled."

THE AYLESBURY DAIRY COMPANY OF LONDON, ENGLAND.

"The Aylesbury Dairy Company of London, England, has a world-wide reputation for the thoroughly satisfactory and successful manner in which it handles and supplies milk to a large portion of the City of London. Its headquarters are at 31 St. Petersburg Place, Bayswater, W., London, with branch offices in fourteen other sections of the metropolitan city. In August last, I visited the plant and was given an opportunity of seeing it thoroughly in all its operations. The Managing Director, Mr. J. A. Hattersley, gave free access to all the books and records of the company and allowed me to have a thorough inspection of all the reports. The visitor who is given such an opportunity and from whom nothing is hidden or withheld, feels that the business is carried on in a straight and commendable manner.

and that the interests of the public are fully considered. The first object seems to be to serve the public, and from what I saw, the mere making of profits is not considered the main business of the company. The second thing that impresses one is the easy and thorough manner in which the best results are accomplished, without the laying down of exacting and rigorous regulations. It is made easy and advantageous for producers to produce good milk and for the employers of the company to give faithful service. At the time of my visit, extensive alterations and additions were being made to the London premises in Bayswater, a good indication of the growth of the business, showing an appreciation on the part of the public.

The supply of milk is drawn mainly from Cheshire, from farms on the estates of the Duke of Westminster and Lord Tollemahe, where the steadings are models of dairy construction. I was told that modern up-to-date buildings are to be found on these farms. Unfortunately, owing to other engagements, I was unable to take advantage of Mr. Hattersley's kind arrangements for my inspecting some of the farms. The farthest point of production is nearly 170 miles from London. Special milk trains are run on the Great Western Railway, picking up the cans, which are delivered at the stations from many branch lines.

When a farmer offers to supply milk to the Company, he is furnished with a list of questions as to the sanitary conditions of the farm, etc. If the answers are satisfactory, the Company sends its Medical Inspector to inspect the farm. He is invariably the Medical Officer of Health for the District, and consequently is cognizant of the state of health of the locality and has immediate knowledge of all cases of infectious disease. He makes, at the Company's expense, an exhaustive report covering the whole field of sanitation and drainage, the personal health of the farmer and his family, of the farm hands and their families, and also of the general health of the district. He also sends for analysis in the Company's laboratory samples of the water used in the dairy for washing the utensils and for refrigeration. Great stress is laid upon the question of pure water for all purposes, for watering the stock, for cleansing and for refrigeration. Then the Veterinary Surgeon is asked to make a report upon the health of every member of the herd. All tuberculous animals must be removed. When satisfactory reports are received from the Medical Officer and the Veterinary, a contract is sent to the farmer to be filled out and signed, fixing the approximate amounts of milk to be sent during each month, the price to be paid for same (which is a matter of arrangement between the Managing Director and the farmers), and requires the farmer to keep the Company fully informed as to the health of his animals and all persons in any way connected with his farm. There is no inducement to concealment, for if through any cause the milk from any animal or from the whole herd is withheld because of sickness, the Company agrees to pay full price for all such milk. The Veterinary makes regular examinations of the herd and the Medical Health Officer keeps a close watch upon the health of the farmer, his help and their families. Reports are received at the Company's office and filed for reference. Any person is permitted to see these reports. The veterinary reports are submitted to Sir John McFadyean, Principal of the Royal Veterinary College. The water is examined by the Company's chemists twice a year at least, oftener if necessary. The Company has its own standard, viz., 3.25 of fat and 8.75 of other solids. An examination of the records showed that the milk of December, 1908, varied from 3.58 to 4.29 per cent. fat; that for May, 1909, varied from 3.19 to 3.81 per cent. butter fat. The average for 1908 was 3.75, the same as for 1907. Every can is tested on arrival for specific gravity and every

farmer's milk is analyzed twice a day, evening and morning milk alternately. The milk is also tested for temperature. A variation of three degrees from the mean is allowed. Any exceeding this amount are investigated as to the causes. Thus, on a certain day, most of the samples stood at 46, 47, 48 degrees F. Two, however, were at 59 to 60. These were at once investigated to determine the cause and the senders were notified and instructions given to prevent further trouble. During a hot day in August (the 11th), a variation of 64 to 74 degrees was found on an examination of the records. On August 20th, the day of my visit, the evening milk of the 19th received on the morning of the 20th varied from 60 to 63 degrees F. The afternoon milk varied from 60 to 66 degrees F.

There are no instructions whatever as to feeding, no recommendations, no prohibitions. Should the milk fall below the standard, the sender would be notified. Should any undesirable flavor or odor be found, the matter would at once be investigated and the farmer would be notified. He would either have to change his feeding or have his milk rejected and contract cancelled.

The matter of health, however, is of paramount importance—health of the animals of the herd, health of the persons on the farm and health of persons to whom milk is delivered, that is, of the customers.

First as to health of herd. Mr. Hattersley went over a large number of veterinary reports. In 1905, out of 32,588 cows examined, from 2,193 in September to 3,148 in November, four were temporarily withdrawn, one was tested and did not react, one was tested and turned out of stock and 16 were turned out of stock on the Veterinary's report without testing. In 1908, out of 35,062 examined, being an average of 2,922 per month, 38 were condemned, 12 suffering from cowpox, 10 turned out without testing, 12 temporarily withdrawn and four tested reacted and turned out of stock.

As to the health of the persons living on the farm reports are received at the head office by letter, telegraph or telephone; instructions are to notify at once and the company will bear the expense. I took the following from the Infectious Diseases Book of the Company showing the cost to the Company:

1899	£92 7 7	1904	£ 95 0 0
1900	57 4 0	1908	306 8 9

In 1908, scarlet fever broke out in the home of a producer. His milk was at once ordered to be withheld until the Medical Health Officer reported a clean bill of health. This one case cost the Company £161 6s. 7d., of which £148 10s. 8d. was the value of the milk not delivered to the Company.

Strict precautions are also taken in regard to health of consumers. Immediately upon receipt of report of a Medical Health Officer the regular delivery of milk ceases, and special delivery is provided, the return bottles being cleaned and disinfected separately from the others. No extra charge is made for this. What strikes one is the extreme care that is taken in regard to all sanitary aspects of the business. Every precaution possible seems to be taken to provide that the milk supplied to every consumer shall be clean, wholesome and safe from a hygienic standpoint. There are six Medical Officers and two Veterinary Surgeons in London who are in regular communication with the Company and 23 Medical Officers and 13 Veterinary Surgeons who report as to the farms.

The milk is cleaned, pasteurized and bottled by machinery. Pasteurization is practised most thoroughly. All milk sent out is pasteurized, except in the case of consumers who desire non-pasteurized milk. For them, a special lot of milk is treated by cooling. The Company make claim that no preservatives of any kind are ever used—that such treatment is not necessary.

The Company sells milk at fourpence a quart. The Company claim that the safeguards devised and put into practice are more sweeping and effectual than the precautions which are now imposed on dairies by Act of Parliament. They cost the Company upwards of £7,500 per annum, amounting to a dividend on the share capital of nearly 4 per cent."

CHAPTER VI.

Being a resume of the laws of other Provinces and States governing the supply of milk for human consumption.

Shortly after the organization of your Commission a letter was addressed to the Government of each of the other Provinces of the Dominion and of the States of the neighbouring Republic, asking for a copy of their milk laws and reports. We beg to acknowledge the uniform courtesy with which our requests were granted, as a result of which we were enabled to extend our study beyond the necessarily limited purview of personal observation. From the official records thus obtained the following brief synopsis has been prepared in the belief that it will be found of interest in the consideration of future legislation.

NEW BRUNSWICK.

By an Act passed in 1904 pure milk is thus defined: "Means the whole of the milk, including what is commonly known as the strippings drawn at the time of milking, but does not include milk that contains less than $3\frac{1}{2}$ per cent. of butter fat, or is mixed with any preservative, or chemical or coloring matter of any kind whatsoever."

The Lieutenant-Governor-in-Council is given authority to appoint "inspectors, analysts, experts and any officers he deems necessary," who are given authority to select sites for dairies, see that they are properly constructed and equipped, hold meetings and give instructions, inspect stock or utensils, see that dairies are clean and wholesome, that the stock is not diseased, that the person handling the cows is not affected by contagious disease, etc., and the sale of any milk not pure is specifically prohibited.

In 1908 the following clause was added to the duties of inspectors: "Give special attention to the sources from which the cities derive their milk supply, and at least once in every year, and more often if necessary, make a thorough inspection of stock, cow byres and vehicles by which such supply is produced and carried, and furnish to owners of said stock a certificate of inspection."

W. W. Hubbard, Secretary of the New Brunswick Agricultural Commission, remarks in letter: "Very little is being done towards carrying out the present law."

QUEBEC.

Quebec dairy laws appear to be mostly, if not entirely, to foster the cheese industry. Provision is made for syndicates of cheese and butter factories and the province is divided into districts for this purpose. Elaborate provision is made for the organization and authority of these syndicates and for adequate inspection. Penalties are provided for the punishment of anyone who "knowingly and fraudulently sells, supplies, brings or sends to any factory for the purpose of being made into cheese or butter, any milk mixed with water or adulterated in any way whatever," etc. Nothing is said about milk delivered to the consumer.

SASKATCHEWAN.

There are apparently no laws on the statute books of this new province yet as to the milk or dairy business. The Government has issued what are called "Rules

for Creamery Patrons and Other Dairymen," which contain some very useful advice as to stables, cows, methods of milking and conditions generally.

BRITISH COLUMBIA.

By Rules and Regulations approved by the Lieutenant-Governor-in-Council on April 1, 1909, inspectors are authorized to inspect all dairies "maintained for the supply of milk to the public" and inspectors shall grade dairies thus:

Grade A.—Premises sanitary, up to standard of Provincial Board of Health, and cows tested and shown free from tuberculosis every six months.

Grade B.—Premises not strictly up to mark, but cows that have been tested and approved.

Grade C.—Premises that conform but cows not tested.

Grade D.—Premises that do not conform and cows that have not been tested.

This grading to be published as directed by the Minister of Agriculture.

Cattle found to be affected by tuberculosis shall be marked "T" in the ear and quarantined and afterwards kept apart or slaughtered at expense of the owner.

Cattle imported for breeding purposes must first be examined by a Provincial Inspector. Fine for violation of this regulation, not less than \$25, or more than \$50.

The Milk Regulations of the Provincial Board of Health were passed in 1904 and include clauses as to lighting, ventilation, cleansing, including white-washing twice a year, water supply, drainage, milk vessels, notification of disease amongst attendants, etc.

"Milk intended for sale shall have the following minimum composition: Fat, 3 per cent.; solids, not fat, 9 per cent.; maximum of water, 88 per cent." Cow keepers and dairymen must have certificate that herd is free from tuberculosis. Penalty is fine up to \$100, jail up to six months.

R. W. Hodson, Live Stock Commissioner, says in a letter: "We have Dairy Inspectors throughout the Province, who visit each dairy farm in their district as often as possible, advising the farmer as to the best methods of producing clean and wholesome milk, testing the cattle where necessary. These inspectors report semi-monthly to this Department, giving us a list of the premises inspected, the number of dairy cows kept on each farm, the condition of the cattle and the condition of the premises. If the premises are not in as sanitary a condition as the regulations call for, we write to the party, forwarding him a copy of the Inspector's report, and advising him to carry out the instructions. We also forward a copy of the Inspector's report to the Municipal Council of the district in which the dairyman is living. The Municipal Council take the matter up and see that our instructions are carried out. With regard to the regulations for the control of tuberculosis, you will notice that we grade the dairies according to their sanitary conditions and as to the test. This is having a great influence in the Province, and our veterinarians are unable to keep up with the work of testing. In the country, we propose that the creameries pay a few cents less per gallon for milk which comes from an untested herd. This, I think, will bring the dairymen who are supplying milk to the creameries to time.

Each city and town has its own regulations governing the sale of milk in the city. In Vancouver at the present time they are endeavoring to have certified milk

marketed, and I might state are meeting with splendid success. Already many of the milkmen have fallen in line, and have put many modern improvements in the dairies and are producing a high class article. The city of Vancouver follows the same system as that of the Government in grading the dairies. In the other cities throughout the Province, the inspectors take a sample of the milk from the wagon of each dairyman supplying milk to the cities at intervals of from one month to three months. The sample is tested and the results published in the paper. You can readily see the result of this. The milkman who is supplying milk low in butter fat, or who is supplying milk from untested cattle, loses his trade, and the man who is up-to-date, has his herd tested, and the butter fat content of the milk reasonably high, gets the patronage."

NOVA SCOTIA.

Regrets to report that there are no laws or regulations as yet.

PRINCE EDWARD ISLAND.

No laws or regulations as yet, but the matter is now under consideration.

MANITOBA.

Not heard from.

ALBERTA.

No laws or regulations as yet, but the Provincial Board of Health are drawing some up.

LOUISIANA'S INTERESTING EXPERIENCE.

Louisiana State has one of the most complete sanitary codes of any of the States of the Union. Practically every matter that could possibly affect the health of human beings is dealt with and safeguarded, and the laws in this connection fill a volume of nearly 300 pages.

The experience of the State in combating tuberculosis among cattle is especially interesting, inasmuch as it is different from any other State. A few years ago, they adopted the compulsory tuberculin test, with a provision that all animals reacting should be slaughtered or segregated according to the Bang method of treatment. They went so far as to empower municipalities which found it impracticable or too expensive to carry out the provisions enforcing the isolation of reacting cows, to establish municipal farms for this purpose. At these farms, provided they exhibited no physical evidence of the disease, the animals could be kept for breeding purposes, and a pasteurizing plant installed to pasteurize the milk. The farm was to be placed under the management of a veterinarian versed in the Bang method of eliminating tuberculosis, and the proceeds were to be divided between the owners and the municipality. In January, 1909, however, this regulation was repealed, and in its place a system inaugurated which works out to eliminate only the cattle showing clinical or physical evidence of tuberculosis. The clauses substituted for this purpose read as follows: "Section 14: No cow shall be used in any dairy or dairy farm which is known to be suffering from tuberculosis, splenic fever, anthrax or any local or general disease which is liable to render the milk from said cow unwholesome, and every person keeping a milch cow for dairy

purposes shall permit it to be examined, without cost to the owner, from time to time, as to its freedom from disease by a veterinarian or veterinarians designated by the health authority, nor shall any cow be brought into or sold within the State of Louisiana for dairy purposes, and no milk therefrom sold unless said cow shall have passed the required inspection by the local health authority.

"Any cow which is found to be suffering from an incurable disease, or from tuberculosis, shall be, at once, taken to the slaughtering pen and there slaughtered, and such disposition made of the hide and carcass as the health authority shall determine. The veterinarian or veterinarians, designated by the health authority, shall examine the milch cows in dairies and dairy farms in this State as often as the health authority shall order. Such veterinarian or veterinarians shall specially examine to discover the presence of tuberculosis in such cows, and no cow not clinically sound of tuberculosis shall be permitted to remain in the dairy, but shall be condemned, removed and slaughtered as hereinabove set forth.

"A clinically sound cow, in this connection (*i.e.*, as to tuberculosis) is defined to be one free from swelling of bones, joints, lymph-nodes or swelling of other soft parts; from induration of portions of the udder; from repeated diarrhoea and discharge from the vagina; from the repeated distention of the rumen with gas; from cough and physical signs of lung disease—these pointing to tuberculosis.

"Provided, that in the event any cow shall present one or more of the clinical symptoms enumerated above, sufficient to create a reasonable doubt in the mind of the veterinarian designated by the health authorities as to the existence of tuberculosis, it shall finally be determined by the application of the tuberculin test; and if said cow reacts under said test, it shall be slaughtered as hereinabove provided."

All cows found to be healthy are to be sold tagged and cannot be removed from the dairy without notifying the health authorities.

In explanation of this important change, the Secretary of the Louisiana State Board of Health, Dr. Hamilton P. Jones, writes the following significant letter to the Commission:

"The reason the Bang method was left out in the more recent revision of the Sanitary Code of the State of Louisiana was that it was deemed impracticable to enforce this method with the money at the disposal of the Louisiana State Board of Health, and also due to the very decided opinion of a number of members of the Board as to whether the dangers of the spread of tuberculosis, through cattle, was of a serious enough nature to warrant this tremendous expenditure at the sacrifice of a more vigorous campaign carried on among members of the human race itself. This was partially brought about by recent investigations made on the Island of Cuba, having a population of 2,000,000 souls, where absolutely no milk except that which has been boiled is consumed, tuberculosis there being more prevalent than it is in any of the States of the United States, and in all of its forms—bone, intestinal and pulmonary. It was also found that the cattle on the island rarely, if ever, have tuberculosis, either human or bovine."

The law of Louisiana also provides that no milk shall be sold for human consumption containing more than 100,000 bacteria per cc.

DISTRICT OF COLUMBIA.

In the District of Columbia, which includes Washington, the capital of the United States, and the home of all the experts of the Federal Government, a very complete milk law is in force. Inspection is the underlying principle. Tuberculin

testing of cattle is not compulsory, although it is strongly urged. Pasteurization is likewise not compulsory. One section reads "The Health Officer of the District of Columbia or his duly appointed assistants, shall have the right to enter, without previous notice, for the purpose of inspection, any dairy or dairy farm within the said district." No person is allowed to keep a dairy farm within the District, or bring or send milk from outside States, without a permit from the Board of Health. Such permit is granted only when the Health Officer, after examination, is satisfied that the milk can be delivered without danger to the public health. Such permit may be refused or revoked whenever the milk supply from said dairy or dairy farm is "exposed to infection by Asiatic cholera, anthrax, diphtheria, erysipelas, scarlet fever, smallpox, splenic fever, tuberculosis, typhoid fever, typhus fever or yellow fever so as to render its distribution dangerous to the public health." The quality standard is three per cent. butter fat and twelve per cent. total solids. Strict regulations have been drawn up respecting water supply, drainage, ventilation, air space, floor space and cleaning, and to secure isolation of cattle suffering from contagious diseases. All conditions apply alike to dairies outside and inside the district.

The population of the District, chiefly located in Washington, is 329,000, about the same as Toronto. The milk comes from 904 farms, located in five different States. In his 1908 report, Dr. C. W. Woodward, Health Officer, states that 4,388 inspections were made during the year, and 72,246 cows were examined; of these, 220 were condemned as unfit, 181 on account of tuberculosis, and 46 on account of diseases of the udder. In the District itself, 726 were tested with the consent of the owners, and 56, or 7.7 per cent. reacted. Dr. Woodward remarks, "The Health Department does not believe that the removal of tuberculosis from among our dairy herds is going to result in the disappearance of all tuberculosis, or even any considerable amount of tuberculosis, among human beings." But he believes that if only one per cent., or eight lives, could be saved, and a correspondingly large amount of sickness prevented, the absolute eradication of tuberculosis from dairy herds would be worth while.

Whatever the cause, there has been a distinct decrease in the infantile mortality during the past ten years. In 1907 there were 2,019 more births than in 1898, and yet there were 124 less deaths under one year and 299 less deaths under five years. There were 108 less deaths under one year in 1907 than in 1906. An analysis of location reveals the fact that the rate under one year in the "alleys" was 296.55, as compared to 171.05 in the street.

CALIFORNIA.

California State law makes it unlawful for any person to interfere with the duly authorized inspectors or agents of the State Dairy Bureau or of any city or county Board of Health entering any place where milk or milk products are produced, manufactured or prepared. The standard is three per cent. butter fat and 8.5 solids not fat. The State boasts of having four certified milk farms, including Arden, owned by the late E. H. Harriman. Dr. A. R. Ward, author of books on milk, is the director of the State Department of Bacteriology. The State Board of Health publishes a fifteen-page bulletin each month on the health of the State.

VERMONT.

Vermont State has just passed a law providing for the inspection of dairies. By the Bill which went into effect April, 1909, all persons selling milk must first

get a license from the Board of Health from the town or city in which they desire to sell. Before the license is granted, the State Board of Health must make a thorough examination of the cows producing such milk, of the barns and utensils, and such license shall not be granted unless the cows are found healthy and the barns and utensils clean and sanitary. Twice a year at least the local Board of Health shall forward samples of milk from all herds to the State Laboratory for examination.

OHIO.

Ohio State in 1908 started a systematic inspection of dairies and creameries under the supervision of the Dairy and Food Commissioner. It was announced by the Commissioner that the visits of the inspector were "not so much for the purpose of securing evidence for prosecutions as to point out the mistakes the producer may be making and help him to correct them." A visit in some instances may change an unprofitable business to a profitable one, an unsanitary product to a sanitary, a bad product to a good one." A special effort was made to improve sanitary conditions, having in mind the healthfulness of the cows, cleanliness of the surroundings of the barns, and utensils, and healthfulness of attendants. The milk standard was 12 per cent. total solids and three per cent. butter fat. It was provided that milk should not be sold in the following instances:

- (1) From cows fed on unhealthy feed;
- (2) From cows fed on wet distillery or starch waste;
- (3) From diseased or sick cows;
- (4) From cows kept in a place that is unclean or in an unsanitary condition;
- (5) From cows kept in a cramped or unhealthy condition;
- (6) When water or other foreign substance has been added;
- (7) When it is unclean, impure, unhealthy, or unwholesome.

MONTANA TUBERCULIN TEST.

Montana appointed a Meat and Milk Inspection Commission in 1903 and inspectors were then appointed in each county of the State, each inspector being a qualified veterinarian. They were instructed to inspect each dairy supplying milk to the public at least once a month and to issue a certificate of health, including sanitary condition, every three months. The certificate of health included the statement that each cow was free from tuberculosis or infectious disease, said freedom to be determined by the tuberculin test. The inspector was also empowered to prohibit the sale of milk if he found lack of cleanliness in the matter of the cows, the stables or the utensils. Twelve per cent. total solids, nine per cent. solids not fat, and three per cent. butter fat constitute the standards of quality. They also have regulations against keeping cows in crowded or unhealthy places or feeding them unwholesome food.

IDAHO.

Idaho State law provides for prosecution in case the milk fails to come up to any of the following standards: three per cent. butter fat and eight per cent. total solids not fat; drawn fifteen days before or four days after parturition; drawn from cows having any disease or ulcers or other running sores; if the cows are kept in a crowded, unsanitary or unhealthy condition, or in unsanitary stables or en-

closures; if the cows are fed on distillery waste or other substances in a state of putrefaction; milk to which has been added borax, boracic acid, salicylic acid or other substance which prevents or tends to prevent normal bacterial action. A State dairy, food and sanitary inspector is employed to enforce this and other food laws, and is given full inspectorial powers. .

MAINE.

In the State of Maine the Commissioner of Agriculture is authorized to investigate the production, manufacture, transportation, storage and sale of milk, cream, butter or other dairy product; to take samples and have the same analyzed. He is also authorized to publish in regular or special bulletins the results of such analyses, giving names of persons from whom samples were obtained, together with any suggestions he may deem advisable. Once a month at discretion he may distribute the result of these analyses to the newspapers of the State. All milk dealers must make State registration and receive a State certificate. Selling milk from an animal known to have tuberculosis is punishable by a fine of from \$5 to \$50. Whoever sells milk from cows known to be diseased, or kept in a filthy or unsanitary condition, or milk to which water or any foreign substance has been added or from which any cream has been taken, or milk in cans or other utensils that are not kept clean and sanitary, is liable to a fine of \$50 for the first and \$100 for the second offence. When milk is found to contain over 88 1-4 per cent. water, or less than 8 1-2 per cent. solids other than fat, it shall be deemed *prima facie* evidence that said milk has been watered, and when milk is found to contain less than 3 1-4 per cent. fat and 11 3-4 per cent. of solids, it shall be deemed *prima facie* evidence that cream has been extracted; in either case a fine of \$50 may be imposed. Protection is given to the owners of bottles, cans, jugs or jars used in the handling of milk or cream by providing that the name of the owner and the word "registered" may be blown in and then registered in the office of the City Clerk and State Secretary and advertised in the local paper for four weeks. It shall be unlawful to detain, mutilate or put any foul or unclean material into such milk can, jug, bottle or jar. Towns and cities of 3,000 or more inhabitants and other towns on the application of ten voters may appoint a milk inspector.

VIRGINIA.

On June 1, 1908, Virginia State installed a Dairy and Food Commissioner. He was given supervision of all foodstuffs. He was directed to foster and encourage the dairy interests of the State and to cause instruction to be given in creameries, cheese factories, farm dairies, etc. He was directed where impure milk or cream was produced owing to improper handling or unsanitary conditions or surroundings, to warn such persons that unless they corrected such conditions they were liable to a fine of from \$10 to \$50 and imprisonment. A systematic inspection of dairies was undertaken all over the State. Preliminary reports showed that dairies operating under inspection of the cities showed up very well, whereas those operating with little or no supervision were in an unsatisfactory condition. Steps were at once taken to bring all dairies up to a good standard. It was found that much interest was shown by dairymen in the sanitary production of milk and feeding and care of their herds, and the inspectors were instructed to give special attention to the educational feature of their work. In drawing up his rules and regulations the Commissioner included dairies along with all other places in which

food was produced or handled in the following list: bakeries, confectioneries, canneries, packing houses, slaughter houses, dairies, creameries, cheese factories, restaurants, hotels, groceries, meat markets. It was provided that they should be "properly lighted, drained, plumbed and ventilated, and conducted with due regard for the purity and wholesomeness of the food therein produced." A standard of 3.25 butter fat and 8.5 solids not fat was adopted for milk.

MINNESOTA.

Minnesota State has had a Dairy and Pure Food Commissioner for over twenty years. Inspection is a leading feature of the milk work. The Commissioner is empowered to make an inspection of dairies and all places where cows are kept and require the correction of all unsanitary conditions found. Municipal authorities are also empowered to provide for the inspection of milk and butter sold in their limits and of dairies and dairy herds kept for the production of such milk or butter. The inspectors report a big improvement in the herds and stables of late years and declare that the dairymen with few exceptions are anxious and willing to improve the conditions of their dairies. The State standard is 3 1-2 per cent. fat and 13 per cent. total solids, and adding preservatives or other adulteration to milk or selling milk from cows kept in an unsanitary condition or which are diseased, etc., is made an offence.

NEW JERSEY CERTIFIED MILK.

New Jersey State in April, 1909, passed a law providing for the incorporation of the Medical Milk Commission, and the certification of milk produced under their supervision. This legislation was secured by the Essex County Medical Milk Commission, the very first organization of its kind, after which all subsequent bodies have been modelled. It provides that any five or more physicians may associate themselves together for the purpose of "supervising the production of milk intended for sick-room purposes, infant feeding and for use in hospitals." They may enter into contracts with dairymen to supply certified milk according to the standards of the Commission. They may certify such milk, and anyone selling milk as certified without a certificate from such commission is guilty of a misdemeanor. The object of the legislation evidently is to give State recognition and protection to certified milk.

CONNECTICUT.

Connecticut State Dairy and Food Laws give the Dairy Commissioner or his assistants authority to investigate the premises of any farm or dairy where any unsanitary conditions affecting the products are suspected of existing. The Commissioner may order the abatement of such condition and for ignoring the order the owner may be fined up to \$25.

The milk standard is 3 1-4 per cent. fat, 8 1-2 per cent. solids not fat; 11 3-4 per cent. total solids; not more than 88 1-4 per cent. water. Skimmed milk must be stamped as such. Milk receptacles must not be used for any other purpose, or be allowed to contain any offal, swill, kerosene, vegetable matter, rotten or putrid milk or any other offensive material.

Power is given to the "warden and burgesses of a borough or the mayor with the approval of the common council of a city" to appoint a milk inspector who may

inspect all milk or cream sold in the city, all animals producing such milk and the places where they are kept and the milk is handled, whether inside the city or not.

"Every person who shall knowingly sell or expose for sale milk or any product of milk from a cow which shall have been adjudged by the Commissioner on domestic animals affected with tuberculosis or other blood disease shall be fined not more than seven dollars or imprisoned not more than thirty days, or both."

MISSOURI.

At the 1909 session of the Legislative Assembly of the State of Missouri, an Act was passed creating a Bureau of Dairying, etc. Under it a State Dairy Commissioner was appointed, and he was empowered to "inspect or cause to be inspected all creameries, public dairies, butter and cheese factories, milk depots, market houses and places where dairy products are sold, wagons, boats, railway cars or other methods of transportation at least once a year." He shall also at least once a year "hold public meetings at each creamery, public dairy, butter or cheese factory" to give instructions in the proper methods for the care and production of milk, in the care and feeding of the cows, in the raising of crops for dairy purposes, etc. He is given full power to enter the places named at any time, including the barns and premises of all farmers who produce milk or cream for shipment. The State standard is fixed at 3.25 per cent. butter fat and 8.75 per cent. solids not fat.

DEFINITIONS.

In pure food laws in force in several States milk is defined as "the fresh, clean, lacteal secretion obtained by the complete milking of one or more healthy cows, properly fed and kept, excluding that obtained within fifteen days before and ten days after calving and containing not less than eight and one-half per cent. of solids not fat and not less than three and one-quarter per cent. of milk fat."

Pasteurized milk is defined as "milk that has been heated below boiling but sufficiently to kill most of the active organisms present and immediately cooled to 57 deg. F. or lower."

EXHIBITIONS AS AN EDUCATIONAL AGENCY.

One of the agencies adopted in the United States for the improvement of the milk supply is the competitive exhibition of milk and cream. The first such exhibition was held in connection with the National Dairy Show in Chicago under the direction of the Dairy Division of the Bureau of Animal Industry of the Federal Department of Agriculture in 1906. This was followed by several State exhibitions, and finally, in 1907, developed into a city exhibition. The first city exhibition was held at Cleveland in 1907, and was continued in 1908, in which year a similar exhibition was also held at Pittsburg. The objects were, first, educational; second, to determine the possibilities in the handling and keeping of milk and cream produced under sanitary conditions and kept cold; and, third, to test a score card for rating fairly and accurately this class of dairy products. There were three classes in the contest, as follows:

Class I. Market milk (raw): This comprised all milk not "certified" or sold under any guaranty as to its quality. A very large percentage of the milk sup-

plied to our cities is of this character. It was specified that the milk in this class must not be pasteurized or contain any preservatives.

Class II. Market cream (raw): It was specified that this product should be sweet, unpasteurized, and free from preservatives.

Class III. Dairy farms: All dairymen having exhibits of milk or cream in the above classes were permitted to enter the dairy farm contest. These farms were visited by the judges and scored on the basis of a score card. The results of this contest were published as Circular 117 of the Bureau of Animal Industry.

At the Pittsburg exhibition there were 50 entries of milk, 11 entries of cream and 20 entries in the dairy farm competition. There were approximately 400 dairymen present at the meeting, which included addresses by several prominent experts on the question. The plan has been found very successful in developing a co-operative spirit between the city and the dairy farmer and has been followed by very beneficial results.

ISLAND OF PORTO RICO.

In the island of Porto Rico a Sanitary Regulation was passed in 1905 providing "that no person could engage in selling milk without securing a license from the Health Officer of the municipality in which the applicant resided. It was provided also that licenses issued might be revoked if the licensee failed to observe the rules, restrictions and conditions under which the license was issued. Each licensee was held responsible for his employees. There is a provision against adulteration. Persons in any way connected with the sale of milk must not, under any consideration, enter any place where there exists contagious disease, but must report such disease at once to the Health Officer. It is added that "no person shall sell or deliver milk at a house that has been placarded for contagious disease, unless such milk is delivered at the door in a suitable vessel which shall not leave the house thus quarantined. Health officers and sanitary inspectors are empowered to inspect and seize milk that is thought to be contaminated or unfit for food, and if such is found to be the fact upon analysis, shall prosecute. One clause peculiar to the local conditions of the island reads: "The Health Officer shall issue licenses for the sale of milk from cows milked on the street at the residence of customers." This industry shall be carried on during certain hours of the morning and afternoon, but never during the noon hours. All persons engaged in this industry shall take the necessary precautions to prevent contamination of the milk and shall adopt the necessary measures so that the udders shall be well washed before milking and that the milker shall have his hands clean and the vessel used for milking shall also be perfectly clean.

CHAPTER VII.

Being the Views of Eminent Experts going to show the Increased Commercial Value of Milk produced under Sanitary Conditions.

In other chapters an effort has been made to present the virtues of cleanliness for the sake of cleanliness and for the sake of protection to health. It is the purpose of this chapter to show the value of cleanliness and sanitation because of the increased revenue which it will mean to the milk producer.

The idea prevails that the only way to increase the returns from a dairy herd is by means of an increase in the price of milk. Experience shows, however, that far from being the only way, it is not even the better way. It is more important to increase the returns by increasing the production per cow and decreasing the cost of production. This can be accomplished by a little extra attention and study, such as would be adopted in the successful carrying on of any other line of business. Those in the dairy business, like those in any other business, should be guided by systematic business principles.

An illustration of what can be accomplished is shown in the experience at one of the public institutions of the Province, which was visited by your Commission. At the Hospital for the Insane at London, considerable attention has recently been devoted to the dairy herd. New concrete floors have been put in the stable and attention has been paid to other points of sanitation. All the cows have been tuberculin tested. Dr. W. J. Robinson, the Medical Superintendent, began with the idea that any cow which did not yield 6,000 lbs. per year would be disposed of. The result was that at the latest test the herd of 20 cows, for the full period of lactation, averaged 7,724 lbs. each. The average number of days' milking was 315. The seven best cows averaged 9,483 lbs. during their lactation period of 350 days. As a result the standard has been raised to 7,000, and they expect in the coming year to have a herd which will average close to 8,000 lbs. each. This has been accomplished by attention to the matter of selection and care, and can be duplicated, to some extent at least, by a large number of dairymen in all parts of the Province. This means a larger revenue from the herd whether the milk be sold for manufacturing purposes or for domestic consumption.

Then, greater care in the production of milk, which is the raw material, means a finer type of cheese or butter, which is the finished product. It is a well known fact that there is great room in this Province and in this Dominion to increase the amount of cheese used for home consumption. One of the surest ways to accomplish this is to improve the quality of the cheese. An enlargement of the market both at home and abroad is earnestly to be desired.

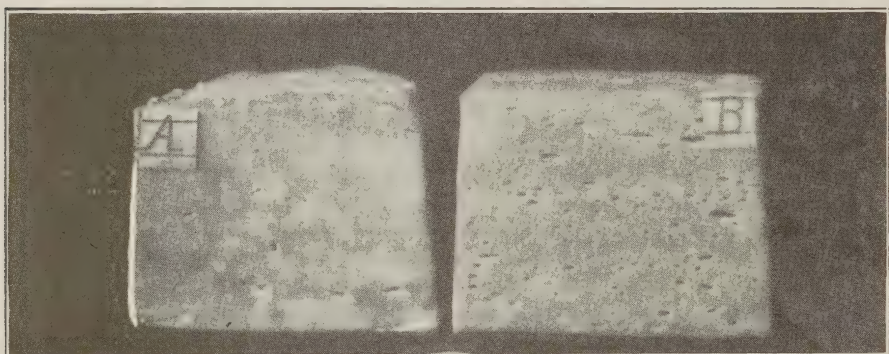
To this end it is important that the most modern experience should be brought to the attention of those engaged in this great industry in this Province. We therefore beg to include in this Report the testimony of men whose positions entitle them to speak with the authority of first-hand knowledge. The statements which these experts have furnished your Commission should be closely studied.

MEANS MILLION DOLLARS YEARLY, SAYS MR. PUBLOW.

Mr. G. G. Publow, Chief Instructor and Sanitary Inspector for Eastern Ontario, says:

"As to the defects in the milk delivered to the cheese factories in Eastern Ontario, I might say that the greatest trouble we have to deal with is the milk being delivered in an over-ripe and tainted condition. These defects are very largely due to the unsanitary condition of the cows and stables and the lack of proper facilities for the cooling of the milk immediately after being drawn. I would suggest that your Commission give this matter your special attention, as I believe that the greatest amount of good can be accomplished with the least expenditure by special attention being given to the conditions on the farm under which the milk is being produced. I feel confident in saying that if all the milk were delivered to our cheese factories in as good condition as the best is at the present time, a pound of cheese could be obtained from about half a pound less milk than is required under present conditions, and the saving in this respect on the milk delivered to the cheese factories in Eastern Ontario this season would amount to nearly half a million dollars.

"As an illustration of this, on August 7th one of our instructors visited a factory in which the milk was being delivered out of condition. The amount of



- A. Curd from milk cooled but not aerated. B. Curd from milk aerated and cooled. Showing the ideal way of caring for milk is immediately cooling with ice or cold water without aeration or exposure to the air. The numerous round holes which are shown in the piece of curd marked "B" are the result of the growth of gas-forming bacteria in the milk. The holes which appear in the curds marked "A" are not gas holes but are mere mechanical holes. The formation of gas holes in the curd is usually accompanied by very objectionable flavors.

milk received on that date was 12,252 lbs. The milk tested 3.5 of fat, and the amount of cheese made from this milk was 1,064 lbs., or, in other words, it required 11.51 lbs. of milk to make a pound of cheese. After spending a couple of days visiting the patrons and having them pay more attention to the sanitary conditions and the cooling of the milk, the instructor spent another day in the factory on August 11th. On this day 12,711 lbs. of milk were received, testing 3.5 of fat. The amount of cheese made was 1,170 lbs., or, it required 10.86 lbs. of milk to make a pound of cheese. These results were obtained under average factory conditions and demonstrate conclusively the advantage to be derived from the proper care of the milk on the farm.

"In addition, the quality of the cheese is greatly improved, and I feel safe in saying that if all our cheese was as good as the best, the value of our cheese would

be increased at least half a cent per pound, which would have amounted to another half a million dollars to the cheese factory patrons of Eastern Ontario this season. These figures speak louder than words."

EXPOSURE TO THE AIR VERY WRONG, SAYS MR. RUDDICK.

Mr. J. A. Ruddick, Dairy Commissioner at Ottawa, makes the following statement: "The main point which has been demonstrated by our investigations during the past two years is that exposure of the milk to the air in any way is likely to cause considerable contamination. Cooling of the milk without exposure to the air in any way is the one strong lesson from these investigations. It is obvious that if we adopt methods which produce better milk and enable us to make a better quality of cheese, the dairymen must derive a direct benefit from it. Such a result is far-reaching in its effects. An improved quality encourages an increased consumption, the demand is improved and values increase accordingly."

Mr. Ruddick also placed at our disposal the results of the experiments of Mr. Geo. H. Barr, chief of his experimental work, on the care of milk for cheese making. Mr. Barr's experiments were a continuation of those of 1908, which pointed clearly to the fact that cooling the milk without aeration immediately after being drawn gave the finest curds and cheese. In the past year's experiments the milk was taken care of by the patrons of a cheese factory following instructions. The idea was to ascertain the loss in making tainted or over-ripe milk into cheese. The forty patrons were divided into two groups, each being given different instructions so as to furnish a comparison.

The results are briefly told in a series of tables. The first shows the effect of the temperature during the night or the flavour and texture of the curd tests and the curds in the vats.

Lowest temperature during night.	Treatment given evening's milk.	Curds clean flavor.	Curds solid texture.
		%	%
59.60	Cooled,	100 0	100.0
59.60	Not cooled,	33.3	33.3
63.64	Cooled,	50.0	100.0
63.64	Not cooled,	50.0	100.0
65.67	Cooled,	100.0	100.0
65.67	Not cooled,	.....	.....
67	Aerated and cooled,	.....	.....
67	Cooled only,	50.0	.....
70.71	Cooled,	100.0	100.0
70.71	Not cooled,	.....	.....

"This table shows plainly that the temperature of the nights had very little effect on the condition of curds when the milk was cooled, but a decidedly bad effect when the milk was not cooled. None of the cooled milk was aerated. The not cooled milk was either dipped or stirred without cooling."

The following table shows the condition of the curds in the vats:

Method of treating milk at the farms.	Number of curds.	Curds clean in flavor.	Curds with no gas.
Cooled without aeration.....	16	81.25	68.75
Cooled and dipped.....	2	.....	.....
Dipped without cooling.....	6	.....	33.33
Stirred without cooling.....	5	40.00	40.00

This shows the loss of fat in the whey:

From milk cooled without aeration .....	.20 %
“ “ and dipped.....	.22 %
“ stirred without cooling.....	.22 %
“ dipped without cooling.....	.24 %
“ in sweet, clean flavored condition.....	.194 %
“ in gassy condition .....	.216 %
“ in over-ripe condition .....	.250 %
“ in over-ripe and gassy condition.....	.273 %

This shows the flavour of the cheese; 1909:

Method of treating the milk at the farms.	Tested when about three week sold. Flavor good but not quite clean.	Tested on Oct. 16th. Flavor good but not quite clean.
Cooled without aeration.....	93.7	50.0
Dipped and cooled.....	50.0	.....
Dipped without cooling	50.0	17.0
Stirred without cooling.....	100.0	50.0

Cheese made between June 11th and August 12th.

“After two seasons’ work,” concludes Mr. Barr, “I am quite convinced that no method of cooling the milk will produce the finest flavoured milk, or make fine flavoured cheese, unless everything is kept scrupulously clean and the cows receive clean, wholesome feed and water.

“Where the whey is returned in the milk cans, it should be pasteurized and the tanks kept clean. It is simply impossible to have the finest flavoured cheese when sour, dirty whey is returned in the milk cans or when rusty milk cans or pails are used. If cheese factory patrons would exercise reasonable cleanliness in taking care of the utensils used for milk and in milking the cows, and then cool the evening’s milk immediately after it is drawn from the cow to sixty or sixty-five degrees, with as little exposure to the atmosphere as possible, and cover it up, we would have practically no bad flavoured cheese to put on the market. Our cheese-makers would be saved much hard labour and worry and there would be thousands of dollars extra in the pockets of both factorymen and patrons.”

STATEMENT BY PROF. DEAN.

On the sanitary production of milk for the manufacturing of cheese, butter and condensed milk, H. H. Dean, Professor of Dairying at the Ontario Agricultural College, makes the following statement:

"This may be considered as a triangular or three-sided question—the farmer's or milk producer's, the manufacturer's, and the consumer's. For our purpose we shall reverse the logical order and consider first the consumer's interest in the subject.

"Every household has butter of some kind on the table for the most part three times a day. Cheese is not so largely used in Canada as in Great Britain because Canadians have yet to learn the food value of cheese in their dietary. Condensed milk and milk powders are coming more into general use. Because of these facts the consumers are largely interested in the question of clean and sanitary milk used in the manufacture of their food products. Hardly anyone would care to use food that he knew to be produced from dirty or unsanitary raw material. It is because of the consumer's ignorance that so little is heard from him on this question. It would pay him to insist upon strictly sanitary milk and cream and sanitary places of manufacture, and then be willing to pay the cost for clean food. The improvement in health and the additional earning power resulting from clean, wholesome food would more than counterbalance the extra price required for the production of the best manufactured dairy goods.

"All manufacturers of dairy products know that it is much easier to make fine goods and more of them out of good than out of poor raw material and that it is easier to sell first-class finished products than it is to sell inferior goods. The finest cheese, butter and condensed milk almost sell themselves. Customers are looking and asking for them and they are pleased when they receive them. A pleased customer makes trade easy.

"Tainted or gassy milk is much more difficult to handle and turn into first-class finished products than is clean milk. More labour is required to manufacture inferior raw material. Hence, the manufacturer has a double interest in trying to secure better milk and cream—his customers will be better pleased with his goods and the cost of manufacturing is reduced. The foregoing principles apply whether the manufacturer be a private owner or a joint stock company.

"Assuming that the milk producer will receive pay for clean milk and cream, and that those who do not come up to a certain standard of care and cleanliness will be forced out of the business, I offer the following suggestions on how to produce reasonably clean and sanitary raw material for the manufacture of finished dairy products.

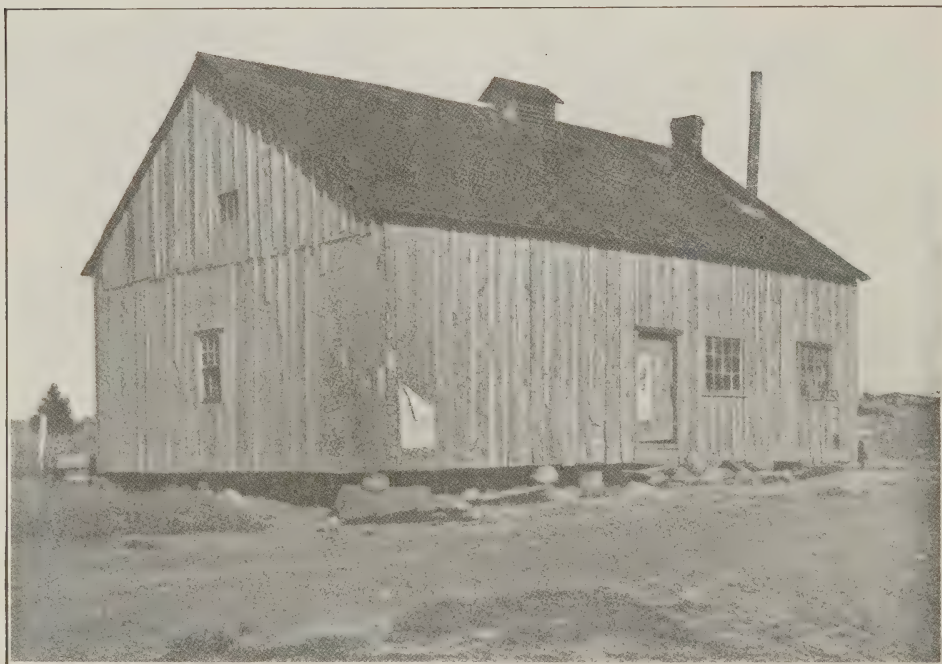
"A clean, healthy cow is the first thing necessary. When healthy cows are out of doors on clean, dry pasture fields, we have ideal conditions for the production of clean milk. It is when cows are brought inside that the trouble begins. In spite of all the devices and contrivances in use on dairy farms, the ideal sanitary housing of cows has not yet been solved. A well ventilated stable, stalls of proper length with a "drop" behind the cows, having the udders and flanks clipped, and the frequent use of curry comb and brush (we have now vacuum cow cleaners) will assist very much in getting clean milk. Give the cows exercise every day in fine weather.

"Cement floors and mangers having little or no woodwork in connection with them are great aids in obtaining clean milk. If the cows tend to cripple on the

cement floor, moveable wooden platforms may be placed in each stall for the cow to stand on.

"The food of the cow should be clean and wholesome, free from dust and bad flavour. Dusty hay and bedding are common sources of trouble in milk. Turnips, distillery slop and wet brewers' grains should not be fed to milk cows. Corn silage, mangels, clover hay, oats, bran and oilcake are standard foods for milk production. Give of the roughage what cows will eat up clean and of the meals according to milk flow—on the average about 4 lbs. bran, 3 to 4 lbs. chopped oats and 1 to 2 lbs. oilcake per cow daily.

"The milker should wear clean clothing, have clean hands, use a clean pail



Cheese Factory, common in Ontario twenty-five or thirty years ago; unfortunately a number still survive.

with a small top, and a clean stool. Wipe the cow's udder before commencing to milk and exercise all reasonable care in order to get clean milk. Visible dirt should be removed at once by the use of a cloth or fine brass sieve strainer—both of which must be kept clean and in fresh air and sunshine as much as possible when not in use. To prevent the multiplication of bacteria where the milk is sent the factory it should be cooled as rapidly as possible to a temperature below 65 degrees F.—better to 50 degrees F. To do this ice is necessary on most farms. One ton of ice for each cow ought to be stored for cooling milk and cream. For cooling milk, a trough or box which will hold all the cans of milk and have room for ice is a convenient method. Milk should be delivered to the manufacturer as soon as possible after it is drawn from the cow.

"Where cream is sent to a creamery, it is best to separate the milk immediately after milking, taking a cream which will test about 30 per cent. fat, then cool the cream immediately to 50 degrees F. or below. It also ought to be delivered to the creamery in the shortest time possible after separating.

"The separator should be located in a clean room, and be thoroughly washed after each time of using.

"These suggestions, if followed, will result in an improved raw material for the manufacture of cheese, butter and condensed milk, which means improved quality in the manufactured goods, which logically means higher prices and more profits to those engaged in the dairy business."

BUSINESS-LIKE METHODS CREATE PROFITS, SAYS MR. HERNES.

Mr. Frank Hernes, Chief Dairy Instructor for Western Ontario, makes the following statement:

"It is a fact well known among our Western Ontario dairymen, and practised



Education and agitation of Dairymen's Associations and other agencies have resulted in the improved condition at factories such as this.

to a greater or less extent by them, that the greater care given the cows in the way of feeding succulent food, having properly ventilated stables and exercising reasonable cleanliness, the greater will be the production of milk per cow, and they are beginning to realize quite fully that, after all, profits must come from the heavy production of the individual cow, with the economical cost of food taken into consideration.

"When the milk has been properly cared for at the farm by proper attention to cleanliness and cooling, it will arrive at the factory in such a condition that the greatest amount and the best quality of cheese can be produced, thus insuring a less number of pounds of milk being required to make a pound of cheese, which means a greater profit.

"When the quality of cheese is the finest that is put on the market, it no doubt stimulates consumption and by so doing increases the price per pound.

"Quoting from some experiments carried on in Western Ontario during the season of 1909, we find that where milk arrives at the factory over-ripe (sour) and tainted, a loss will occur during the manufacture equal anywhere from 10 to 30 lbs. of cheese in a vat of milk containing 5,000 lbs. This loss will be somewhat according to the degree of acidity at which the milk is received. Putting cheese at 11 cents per pound, we have a loss to the patrons of from \$1.10 to \$3.30 on 5,000 pounds of milk. Not only have they this loss, but it is impossible with even our most skillful makers to produce cheese from such milk that will pass as the finest, so that often there is a second loss on quality when the cheese are placed on the market, anywhere from 1-8 to 1 cent per pound of cheese.

"Cheese made from tainted or over-ripe milk when placed on the market must not only often be sold at a lower price, but take the place of the finest cheese, and in that way help to stop consumption, as consumers will buy a larger quantity of fancy goods even at higher prices than they will goods of poor quality and flavour. The other producers of milk must also suffer in many cases for the neglect of a few patrons who do not take proper care of the milk, since all the milk is mixed together on arrival at the factory and any loss on quantity or quality must be borne by all the patrons of the factory, although the tainted milk may have been furnished by only a few patrons.

"Something along the same lines may be said with regard to the production of cream for the creameries. When thin, sour, tainted cream is sent to the creamery, the butter will be of poor quality, off in flavour, lacking the necessary keeping qualities, and the loss of fat in the buttermilk after churning will be very much greater than from cream received in proper condition. So that not only does the general quality of the butter made depreciate in value, but a less quantity can be made from the cream. Poor butter also lessens consumption and becomes more or less a drag on the market, besides injuring the reputation of the finest creamery butter.

"The sanitary condition of our factories also has an effect on the general price received, since if consumers are assured that all dairy products are manufactured under clean, sanitary conditions, and by men who are known to be clean and tidy, they will without any hesitation buy a greater quantity of such products.

"Arguments innumerable can be put forward that clean, sanitary, business-like methods will create profits in the dairy business. We believe these up-to-date methods are growing in Western Ontario."

INSTRUCTOR GIVES CONCRETE ILLUSTRATION.

As a result of his experience during the past summer as Dairy Instructor, S. S. Cheetham makes the following statement:

"What is much needed at the present time is that the factories and their surroundings inside and out be kept in a better sanitary condition, with a cool curing room in connection, where the temperature can be controlled and the whey properly pasteurized from start to finish, and the raw material delivered to the factory in a clean, sweet, cool condition. With these conditions we should have no difficulty in making 2.6 of a pound of cheese for every pound of fat in the milk. One of our factories which is equipped with a cool curing room, where the temperature can be controlled, started pasteurizing whey last spring and they succeeded in making 2.6 of a pound of cheese for every pound of fat in the milk from May 1st until Novem-

ber 1st. Last season I received a monthly statement from 9 of the factories in my section and I found that the makers could and did make 2.6 of a pound of cheese for every pound of fat in the milk for the months of May and October, although the milk tested 3.4 in May and 4.1 in October, and those 9 factories lost in the other four months over \$2,000 by not being able to make 2.6 of a pound of cheese per pound of fat in the milk.

"August 7th—milk received, 12,252 lbs.; cheese made, 1,064 lbs.; an average of 11.51 lbs. milk to make a pound of cheese. The milk arrived at the factory at 83 degrees temperature and had a lactometer reading of 31.5 at 60 degrees and contained 3.5 per cent. of fat. August 10th—I visited factory and asked patrons to deliver their milk the next morning in a good cool condition. August 11th—milk received, 12,711 lbs.; cheese made, 1,170 lbs.; or an average of 10.86 lbs. of milk for a pound of cheese, or 14 lbs. cheese over, making 2.6 of a pound for every pound of fat in the milk, and making a gain of 67 lbs. cheese on the one day's make, or at the selling price at that date, of \$7.71.

"Now what have we lost in these 42 factories this season? Had we made 2.6 of a pound of cheese for every pound of fat in the milk, we would have made 96,356 lbs. more cheese, which is worth at the selling price, \$10,850.54."

CHAPTER VIII.

Being the Story of the Influence of Infants' Milk Depots in Lessening Infantile Mortality in other Countries and some Figures to show that more should be done along these lines in Ontario.

Infantile feeding and infantile mortality are subjects so closely allied as to be inseparable. Cow's milk is the chief factor in artificial infantile feeding. Artificial feeding has become so deplorably general that experts affirm that the great majority of deaths under one year are from among those who for one reason or another are denied the nourishment nature intended. To these fundamental facts more and more thought and study has been devoted during the past few years in Europe, in England and in the neighbouring Republic. The results have been so illuminating in showing this to be a very important phase of the milk question that we feel it incumbent upon us to digress briefly from the general problem to call attention to some facts and figures in reference to Ontario which must be regarded as striking, if not startling.

DEVELOPMENT OF MILK DEPOTS.

This branch of milk reform has been worked out through infant milk depots and kindred agencies, and the story of their history and accomplishments as set forth in current literature is of interest and importance. They are of French origin, being known in France as "consultation de nourrissons" and "goutte de lait." As first established in 1893, the "consultations" were connected with Paris hospitals, and hence the "goutte de lait" more closely represents what is understood now by an infants' milk depot, and they were not started until 1894 by Dr. Leon Dufour at Fecamp. In the meantime, in 1893, Mr. Nathan Straus had opened his first depot in New York to dispense his scientifically pasteurized milk. It was not until 1899, ten years ago, that the idea was introduced in England, the town of St. Helen's in Lancashire being the first to adopt it. Once introduced, the idea was quickly taken up by Liverpool, Battersea, Finsbury and other large centres. During the past five or six years there has been remarkable activity along those lines. Over a hundred places in France are now served by these depots, which have also been established or extended in the cities of almost every country in Europe. In 1906, a conference of health authorities and others interested in the reduction of infantile mortality was held in London, England, and at it a unanimous resolution was passed recognizing the importance of milk depots and urging legislation to enable sanitary authorities "to establish or support depots for the supply of pure or modified or sterilized milk and to defray any cost out of the monies available for public health purposes." In the last session of the British House of Commons, Hon. John Burns introduced a Bill granting this request, but action was deferred until next session.

DIFFERENCE IN DETAILS.

While they are all guided by the same underlying principles described herein in reference to Rochester and New York, they differ as to details. In Europe, they are supported chiefly by private philanthropy; in England, partially by private

philanthropy, but mainly by municipal grants; in the United States, chiefly by private philanthropy, and, occasionally, as in Rochester, by municipal contribution. In some cities they are conducted during the entire year and in others only during the summer months. In many places in Europe and in some in England the milk is sterilized before being distributed; in others it is not boiled, but only pasteurized; while in still others clean raw milk is supplied. In this connection Dr. G. F. McCleary, formerly Medical Health Officer at Battersea, London, England, in his book "Infantile Mortality and Infants' Milk Depots," says "These methods (Rochester, U.S.A.) are far in advance of anything which has been done by the British municipalities, and it is much to be hoped they will be introduced in this country."

In all the work, however, there appears to have been a common recognition of the fact that milk in itself is only one factor, and that with it must go education in hygiene and sanitation. Equally as important as pure food has been the instruction in how to use it. Large cities in England have their "lady visitors" to follow the milk into the homes, to educate the mother and to improve the environment. In American cities the milk is distributed under the direction of trained nurses or doctors and to their advice and supervision as much as to the pure milk itself must be attributed the results.

SAVING INFANT LIVES IN ENGLAND AND THE UNITED STATES.

Individual depots cite individual triumphs. The death rate of infants fed at the Finsbury depot showed only 76.9 per thousand births, compared to a general rate of 148.6 in the same borough. Liverpool depots showed a rate of 76 per 1,000 as compared with a general rate of 151.

But it is as a factor in the splendid general reduction of the infantile mortality in England during the past six or eight years that we desire to consider it here. Up to 1900, the infantile mortality of England and Wales remained practically stationary or slightly on the increase. Since that time, according to official reports, there has been a gradual decrease. The following figures are taken from the statistics recently issued by the Local Government Board, and show the number of deaths for England and Wales under one year per thousand births in the periods named:

1873-1877.....	148	1898-1902.....	152
1891-1900.....	181	1907.....	118

It was found that cities showed an infantile mortality about one-third heavier than the rural districts; yet the reports of the Medical Health Officer for London for 1907 shows a rate of only 116 for that year, and gives the following comparative figures for leading English cities:

	1897-1906.	1907.
London.....	148	116
Liverpool.....	180	144
Manchester.....	182	146
Birmingham.....	182	147
Leeds.....	170	130
Sheffield.....	180	145
Bristol.....	137	100

HOW ROCHESTER SAVES INFANTS' LIVES.

In visiting Rochester, Syracuse and New York, your Commission made special enquiries as to the efforts to reduce infantile mortality.

Rochester stands out prominently on the pages of milk literature as being the home of Dr. George W. Goler, one of the leading students of the question on the continent and one of the most successful health officers in the protection of the lives of infants. Since the Goler system of infants' milk depots was established, the number of deaths of children under five years of age during the hot months



Interior Rochester's portable milk house at farm, showing trained nurse preparing pure modified milk for infants.

of July and August has been practically cut in half. And that is why Dr. Goler has made his city famous among students of the milk question.

Your Commission found Dr. Goler a man of much zeal and energy, courteous both in explaining his plan and in showing it in operation. They learned that about twelve years ago Dr. Goler had been strongly impressed by the fact that more children under five years of age die during the months of July and August than in any other two months in the year, and that a large number of these die of intestinal troubles. Following up these observations, he concluded that bad milk was responsible for many of these deaths. Appalled by the economic waste as well as the sadness of this pitiful slaughter, he hit upon the idea of a special supply to meet the special conditions which prevailed during these few months.

Arrangements were made to purchase the milk from a certain number of cows on a nearby farm for the two months, to have it modified, chilled and bottled by a trained nurse and to have it placed in the hands of the city mothers. This was the plan inaugurated in 1897, carried on successfully ever since, and shown your Commission on their visit.

JUST AN ORDINARY FARM.

First the farm. It was just an ordinary farm and just an ordinary barn, located about six miles from the city. The cows had all been subject to the tuber-



Rochester's simple plant for sterilizing bottles at farm for infants' milk.

culin test, but otherwise they were just ordinary cows. The barn was kept clean and screens were over the windows to keep out the flies. A small-top pail was used in milking, and for the infants' milk a thin linen strainer was placed over the opening, although the man milking the next cow used no such precaution.

As each cow was milked, the milk was taken to the milk-house twenty-five yards away. This milk-house was the property of Rochester. It was a simple, portable structure of wood and screens, so constructed that it might easily be taken down at the conclusion of the summer's work and if necessary taken to another farm the next year. This milk-house was equipped with apparatus for bottling and chilling the milk, which was first modified to suit infants of different ages. It was

in charge of a trained nurse, and less than ten minutes elapsed from the time the milk was drawn from the cow until it was bottled, sealed and placed in ice awaiting the time it would be taken to the city. Samples of this milk were taken each day for bacterial count, and during July, 1909, it ranged from 2,214 up to 19,904, averaging 5,887. It will be noted that there was no pasteurization or sterilization of this milk. For two years pasteurization was adopted but this was afterwards abolished, and Dr. Goler now describes this period as a "grave mistake." Figures are quoted in support of this assertion. From 1897 to 1899 the milk for infants was pasteurized and during July and August of those years 368 children under five died. Then pasteurization was stopped and in the next three years the deaths under five totalled only 223.

DISTRIBUTING IN THE CITY.

In the city there were five infants' milk depots from which this milk was distributed, each depot being located in a congested district, and being in charge of a trained nurse. To these depots the mothers are requested to bring their babies and receive advice as well as milk. The milk is supplied in half pint and pint bottles at a price which figures out eight cents a quart. But if the applicant presents a certificate from a doctor that she is unable to pay, the milk is supplied free. Printed instructions, which may be had in any one of five languages, are also distributed with a view to educating mothers on this vital subject. A record is kept of all the babies being supplied from each depot and an effort is made to follow up each case and note the progress being attained in keeping the infant healthy and well. Supplying clean, pure milk, modified to suit the tender, infantile digestive organs is obviously of inestimable value; but the great educational influence of the nurse and the literature should not be under-estimated.

THE FINANCIAL SIDE.

Of course all this costs money, but not so much as might at first be supposed. The aim has been to keep the expenditure around \$1,000 a year, and last year it exceeded this by only \$380. There is but little capital outlay involved. The farmer is paid for his milk by the quart according to the quantity used, and as many of his regular customers are away from the city during the hot months of July and August, he is generally glad to dispose of the surplus milk in this way. Sometimes the milk is taken from the same farm for two or three years in succession, but aside from the merits of the scheme in supplying safe milk for babies, Dr. Goler believes it has a distinct value in educating the farmer to a higher standard of sanitary cleanliness.

FIGURES TELL THE STORY.

Only during July and August has this special milk for infants been supplied and hence the cold, plain figures of the mortality returns furnish the test of its efficacy. The figures given below show the total deaths under five years of age for these two months for the nine years prior to the adoption of the scheme and the last nine years of its working and show that although the population has materially increased, the deaths in these classes have decreased by almost half.

	July deaths.		August deaths.	
	Under 1 yr.	1 to 5 yrs.	Under 1 yr.	1 to 5 yrs.
1888	90	28	118	25
1889	133	18	83	24
1890	88	18	94	18
1891	81	15	93	17
1892	101	26	104	34
1893	99	16	85	19
1894	82	12	72	29
1895	92	16	56	11
1896	108	18	59	17
	874	167 874	764	194 764
Total July deaths		1,041	Total August deaths...	958

	July deaths.		August deaths.	
	Under 1 yr.	1 to 5 yrs.	Under 1 yr.	1 to 5 yrs.
1900	50	16	54	14
1901	37	12	38	8
1902	26	5	43	20
1903	32	16	34	18
1904	15	11	43	6
1905	53	10	60	13
1906	59	7	70	7
1907	29	23	71	17
1908	55	19	52	16
	356	119 356	465	119 465
Total July deaths		475	Total August deaths....	584

Entire credit is not claimed for the milk alone. To the advance in medical science and sanitary and hygienic education is attributed a share of the credit. As far as the total annual death rate is concerned, the effect is also splendidly noticeable. Before the adoption of the plan, the rate ranged from 27 to 37 per 1000 population; whereas since, it has ranged from 17 to 22. In 1908 there were 2807 deaths under five years of age, being 19.7 per 1000 in a population of 200,000. Dr. Goler has prepared a chart to show that the death rate goes up or down as the bacteria count in milk goes up or down.

EDUCATIONAL CAMPAIGN IN SYRACUSE.

With the exception of a recently inaugurated educational campaign, no special attention appears to have been paid to the question of infantile mortality in

Syracuse and the rate is somewhat alarmingly high. During the year 1908 there were 542 deaths under five years of age. Taking into consideration the fact that the population of Syracuse is 124,000, this number does not compare well with Rochester, where there were only 551 deaths in 1908 to a population of 200,000. In other words, the number in Rochester under five made up only 27 per cent. of all deaths, whereas the number in Rochester under five made up only 19.7 per cent. of the total. With a view to ascertaining the cause of an infantile mortality rate which the Medical Health Officer describes as "appalling," a rigid oversight is being kept on all infant deaths. A record is kept of all deaths under one year under the following heads: Name and address of child; milk or condensed milk used; name of milkman or brand of condensed milk; whether breast fed or



Interior Nathan Straus Pasteurized Milk Laboratory. A similar system has been installed in the Hospital for Sick Children, Toronto. At the left milk in nursing bottles being placed in the pasteurizing ovens; at the right milk in cans being put in oven to be pasteurized for serving by the glass at the summer stations in the parks.

given a prepared food; if artificially fed, name of food. This information is especially useful in following up any outbreak of contagious diseases. But in addition to this the department has prepared a little leaflet containing simple yet helpful advice to mothers on the care of the baby, especially with reference to his milk. Two thousand of these were distributed in 1908 indicating that they were being appreciated.

NATHAN STRAUS' NOBLE WORK IN NEW YORK.

Eighteen years ago Nathan Straus, a wealthy New York merchant, was living in the Adirondacks. He kept a cow to supply milk for family use. Although it was an apparently healthy cow, it was found dead one morning and further examination revealed the fact that tuberculosis was the cause. It was a startling

fact to Mr. Straus and he gave the moral a wide and unselfish application. If he, a man of means, was thus exposing his family to the dangers of disease from contaminated milk, what of the thousands of poor children of the great city whose lives were daily menaced in his way? His interest in the milk supply was aroused. It appealed to his philanthropic instincts and the work has grown so that now, in addition to his main laboratory, he has six depots distributing last year 4,167,675 bottles and 1,411,017 glasses of pasteurized milk.

PERFECT PASTEURIZATION.

In fact in visiting the Straus Laboratories in New York your Commission



Nathan Straus milk depot, dispensing modified and pasteurized milk in nursing bottles.

doubtless visited what might be described as the chief centre of pasteurization influence on the continent. Although Mr. Straus himself was out of the city, every courtesy was afforded by Dr. Arthur Randolph Green, Medical Director, and Mr. William Wirt Mills. It was quite evident that the system of pasteurization as carried on at this laboratory was as nearly perfect as it is possible for science and philanthropy to achieve. It was quite evident also that pasteurization meant something different when it bore the name of Straus than when it adorned the label of the average milkman as an advertising catchword. The rooms were large and light and spotlessly clean and the pasteurization plant of the most up-to-date standard, but aside from this there were two outstanding features which should be carefully noted. In the first place the milk used is clean milk, certified milk in fact, purchased at eight cents a quart on the farm. This precaution is taken

by Mr. Straus to avoid any suggestion of "pasteurizing dirt." In the second place the milk is bottled and sealed before it is pasteurized. This is done to prevent any possibility of contamination between the pasteurizing and bottling process, and as far as the observation or reading of the Commission goes, this is one of the few where such a precaution is taken. The milk is heated in the bottles for twenty minutes at a temperature of 158 degrees F. As for the process known as "continuous pasteurization," the Straus authorities not only do not adopt it, but regard it as absolutely farcical. Proper pasteurization, however, they maintain, kills all pathogenic germs without affecting either the nutritive or digestive qualities of the food.

DEFICIT ABOUT \$100,000 ANNUALLY.

But pasteurization and its subsequent prompt and complete cooling is not the sole work of the laboratory. Before being bottled at all the milk which is intended for infant feeding is modified in four different formulae prepared by medical men who are experts in the treatment of infantile diseases. This modified milk is put up in special three and six ounce bottles and sent out to the seven depots located in the poorer sections of the city. Each depot is in charge of a trained nurse and a doctor is available for consultation each day. Thus each infant receives personal, individual attention in addition to pure, pasteurized milk. Moreover, the milk is sold in the parks by the glass at a penny a glass and the scores of thirsty men and nursing mothers who surround the booths attest the fact that it is a very popular beverage. The milk is sold at eight cents a quart, actually what it costs on the farm, and so the cost of the expensive pasteurization plant, nurses, doctors and distribution machinery must be borne by someone. It is borne by Nathan Straus and is said to cost upwards of \$100,000 a year. This is Mr. Straus' philanthropy. It is perhaps not fair to describe this deficit as a "loss." Its returns are in the benefits conferred on humanity, in the lives it saves to brighten homes where the struggle for daily bread leaves little time for joy.

SAVING THE BABIES AND HOW IT IS DONE.

During June, July and August in 1892, 6,612 children under five years of age, died in New York. In 1893, the first year of the Straus depots, the number was 5,892. Ever since that time there has been a general decrease, with the exception of a year or two when there were slight increases. In fact the extent of the decrease would seem to synchronize with the extent to which Straus and similar agencies broadened out until 1909, in spite of increased population, the number was only 4,104. Similarly in 1893 deaths under one constituted 25.30 per cent. of the total, while in 1907 they were only 18.71 per cent. of the total. This is a distinct achievement—how has it been brought about? Partizans of pasteurization affirm that it is the direct result of pasteurization under the Straus system. No one would desire for a moment to minimize the credit due a noble philanthropy, but if this is the cause, or a material contributory cause, how much credit is due to the fact that the milk was clean and pure before it was pasteurized in accord with the methods of the most approved science, how much to the influence of the doctors and nurses, how much to the educational effect of the personal advice and literature in all languages? Then, partizans of the Health Department attribute it to the excellent system of inspection and supervision inaugurated by Dr. Darlington and the general campaign of education carried on under the direction of

the Department. But in addition to these agencies, milk depots are maintained by the New York Milk Committee, the Good Samaritan, the Diet Kitchen Association, and the Children's Aid Society, and to prevent overlapping they are all under the direction of the Health Department. There is also a small amount of certified milk. A circular prepared by the "Conference on the Summer Care of Babies," representing the Departments of Health and Education, fifty hospitals, dispensaries, settlements and other agencies is given a wide circulation affording the mothers advice as to what to do in case of illness and giving the addresses of milk depots where pure milk may be obtained. With all these agencies at work with the same lofty purpose, a reasonable view would seem to be that credit is due the combined effort rather than any isolated factor alone. But the proud fact remains that the lives of hundreds of infants are saved each year, and if, in spite of the handicap of the congestion of an immense population human effort can achieve such splendid results, it should be an inspiration to those blessed in far greater abundance with those glorious, God-given aids to health—fresh air and sunshine.

RATES IN AMERICAN CITIES.

For purposes of comparison the rates in American cities are given from figures given in the official report of the respective health officers:

Rochester	86	New York.....	144
Detroit.....	136	Chicago	156

These figures represent the number of deaths under one year of age to every thousand births.

INFANTS' MILK DEPOTS STARTED IN ONTARIO.

In Ontario we found no general attention has been paid to the question of infantile mortality, but we are glad to record that a start has been made with infants' milk depots in Toronto and Hamilton.

In the summer of 1908, the first organized efforts were put forward to furnish a safe milk supply for infants in Toronto. Following up an agitation he had been making in one of his publications, and acting on the advice of friends, Mr. James Acton organized the Pure Milk League. Mr. Acton himself became president, R. H. McBride, Treasurer, and C. D. Daniel, Secretary. They wrote to a few public-spirited citizens and had no difficulty in securing sufficient money to carry on the work. They began in a modest way. Two distributing depots were opened, one on Edward street to serve "the Ward," and the other at the Fred Victor Mission to serve the more easterly districts. "Certified Milk" was secured from the Price Farm at Erindale, costing eleven cents per quart delivered in the city in half pint bottles. These were retailed at two cents per half pint—the same price as ordinary uncertain milk—to those who could afford to pay, while to others it was distributed free. Lectures were delivered to mothers at the Fred Victor Mission by Dr. Helen McMurchy, on baby hygiene, and pamphlets on the care of infants were distributed. Two Deaconesses assisted in the work of distributing and also visited the homes. So much appreciated were these efforts by the mothers that the depots had to be kept open until September 26th. Over 150 babies were served, and over 15,000 half pint bottles of milk were distributed. The net cost amounted to only about \$500, and was more than met by private subscription.

In the summer of 1909, the work was extended and two more stations were opened. Milk was secured from the Manor farm and was certified by the Academy of Medicine. Although Mr. Acton and his associates continued to direct the work, a grant of \$500 was made by the city towards its support. Altogether about 20,878 half-pint bottles of milk were distributed this summer, all but 3,755 being paid for by the consumer at the rate of eight cents a quart; the total cost for the summer was \$760.31, and the League had a balance on hand at the end of the season of \$292.48. It will therefore be seen that there is not only scope for extending the work, but the means to do so.

PASTEURIZATION PLANT INSTALLED.

Such work, carried on as it is by public-spirited citizens anxious only to lessen suffering and improve their city, is to be heartily commended, and the fact that a new, active and aggressive factor is about to join in this noble work on behalf of Toronto infants is to be heartily welcomed. Mr. J. Ross Robertson has added to the splendid equipment of the Hospital for Sick Children a modern plant for scientifically pasteurizing milk. On a visit to the Hospital we found it to be modelled exactly on the lines adopted by Nathan Straus in the great work he has done in saving infant life in New York, more fully described in another page. The raw milk, while not secured from a "certified" farm, is secured from a "model" farm. On arriving at the Hospital, it is modified and pasteurized in bottles by being heated to 158 degrees for twenty minutes. The plant was installed in October and it is the intention not only to supply the Hospital with milk pasteurized in accordance with the most scientific regulations, but also to supply infants outside the Hospital as well. It is being used for 1,200 in-patients and nearly 12,000 patients each year in the outdoor department. It is, of course, delivered to the children in the wards, but it is called for by those outside who desire it. Physicians prescribe the pasteurized milk and also use it in the modified milk mixtures, formulæ of which will be found in the appendix to this Report. In addition, a start has been made in supplying outside charities by supplying twenty-five or thirty bottles a day to the Evangelia House in the east end of the city. This work will be enlarged and supplies furnished the Infants' Home and other charities and dispensaries where infants are cared for. The pasteurizing plant at the Hospital is sufficiently large to enable them to do this work for very little extra expense, but is not sufficiently large to permit any attempt to deliver milk to the public at large.

HAMILTON ALSO MAKES A START.

During the past summer an effort has been made to secure a special supply of safe milk for infants at Hamilton. Dr. James Roberts, Health Officer; Frank Quinn and William Farrar, representing the Board of Health, and Dr. Perry, representing the Milk Commission of the Hamilton Medical Society, visited Rochester and examined the Rochester system of infants' milk depots. Returning, the plan was urged upon the City Council, but they did not see their way to adopt it, and hence it was undertaken by the Medical Milk Commission in co-operation with the Victorian Order of Nurses, and the necessary funds were secured from private sources. Through the courtesy of Dr. Roberts and members of the Board, we visited the farm during the month of August. Following the Rochester example, the milk was secured from an ordinary barn which had little to distinguish it except its cleanliness and the care exercised in the handling of the milk. The in-

terior of the stable was whitewashed and the floors kept clean, but the cows were not kept in a separate building from the horses, nor is there a partition between them. In the special milk house, two nurses attended to the cooling, modifying and bottling the milk before it was sent to the distributing depot in the city. At the close of the summer a statement was issued by the Hamilton Milk Commission giving the record of the work during August and September. It stated that when the milk was first offered in July only 31 feedings were taken daily, but when the supply was discontinued, 850 feedings were being distributed daily, supplying 338 infants. Of these only 22 died, regarded as very few. During August and September the infantile mortality from cholera infantum aggregated 59 compared to 90 for the same two months last year, a decrease of 30 per cent. The total number of deaths from all causes was 91 compared with 126 in the same period last year.

FIGURES FOR ONTARIO.

In contrast to British and American cities given above, we beg to submit the following figures for Ontario cities for the latest year available, 1908. As the completed figures for the Province will not be ready for publication for some months, they are taken from the official records in the office of the Deputy Registrar General, through the courtesy of Dr. Chas. A. Hodgetts.

City.	Births (still births excluded).	Deaths under 1 yr. (s. b. ex- cluded)	Deaths under 1 yr. per 1,000 births.	Percentage under 1 to total num- ber of deaths.
Ottawa.....	2,019	438	216.94	30.23
Fort William.....	434	88	202.76	32.71
Port Arthur.....	369	69	186.99	31.22
Niagara Falls.....	203	36	177.34	24.49
London.....	1,001	172	171.83	23.99
Belleville.....	242	41	169.42	22.91
Toronto.....	7,805	1,215	155.67	26.74
Guelph.....	303	46	151.82	23.83
Hamilton.....	1,821	275	151.02	26.42
St. Thomas.....	325	48	147.69	20.43
Chatham.....	228	33	144.74	18.44
Kingston.....	380	55	144.74	15.99
Peterborough.....	453	61	134.01	22.68
Windsor.....	384	50	130.21	21.74
Brantford.....	588	73	124.15	23.78
Stratford.....	301	36	119.60	21.05
St. Catharines.....	280	33	117.86	18.64
Woodstock.....	201	16	79.60	13.01
			average 160.62	25.80

In making comparisons much depends of course on the accuracy with which returns are made in the various places compared, but all the figures are taken from official reports and constitute the only basis on which to work. It is admitted that returns now being made in the cities of Ontario at least are practically complete. The fact that this can only be said of very recent years renders it im-

possible to make comparison with other years with any degree of reliability. In addition, in the case of the smaller cities it will be noticed that the difference of very few deaths would make considerable difference in the ratio per thousand, which is the usual basis of comparison.

MORE IN FIRST YEAR THAN FOLLOWING FORTY.

These figures, it will be noted, exclude still-births, which would have materially increased the percentage, but which cannot fairly be included in considering preventive methods. They show that out of every thousand children born alive in Ontario cities, one hundred and sixty die in the first year, or, in other words, more die in the first year than in the succeeding forty. Because of this enormous preponderance of deaths under one, over deaths in any other year of life, consideration in detail has herein been confined to that class alone, but at the same time it should not be overlooked that the same methods which in other places have reduced the mortality under one have reduced the mortality between one and five. Altogether in Ontario cities the number of deaths under five years of age aggregate 3,527 and constitutes 32.68 per cent., almost one-third of the entire number of deaths from all ages and all causes. It necessarily follows, however, that improvements which will conduce to greater healthfulness in the first year of life will conduce to greater healthfulness in the years that follow.

CONSIDERABLE CAN BE PREVENTED.

To merely state that more die in the first year of life than in the following forty, is, unfortunately, not new. What appears to be sadly new in this Province is that a considerable portion of this awful toll can be prevented. The cold fact that out of every thousand children born alive, sixteen more die in Ontario cities than in New York, four more die than in Chicago, and forty-four more die than in London, in spite of the slums and congestion reputed to these great cities, should touch the sympathies and arouse the consciences of Ontario cities and Ontario citizens. It is true that conditions differ, but in general it may be said that the two main influences which affect all life adversely or favorably are, (1) heredity and (2) environment. This second heading includes such influences as food and drink, including tea, coffee, alcohol and narcotic drugs; air, sunshine, climate (heat and cold), clothing, occupations, healthful or harmful exercise, rest and recreation, cleanliness, including bacteria and the cause of contagious and infectious diseases. Of course infants born with a bad heredity or "poor constitution" have little chance of surviving in a bad environment and especially with bad or unwholesome food. It might be urged that the evenness and comparative moderation of climate contribute somewhat to the low rate in England, but, on the other hand, the congestion, slums and poverty frequently attributed to English cities in horrifying pictures, must be reckoned with as an influencing factor. A closer analogy to Ontario cities from the standpoint of size and climate is found in Rochester, with a population of 200,000 and an infantile mortality of 86 per thousand, almost half the average for Ontario cities. The great fact, however, which stands out as a beacon light of hope alike from the experience of British and American cities is that the rate has been very materially reduced. Where the problem has been honestly faced and grappled with, success has invariably followed, although there are

doubtless many American cities which would not compare favorably even with Ontario. Through infants' milk depots pure food has been provided, and, equally important, education in feeding and sanitation has been afforded.

MUNICIPALITIES SHOULD ACT.

In making enquiries into milk conditions generally, these facts in reference to Ontario's infant mortality, illumined by comparisons from other countries, have so impressed your Commission that we consider it our duty to call your attention to the matter and respectfully suggest that the attention of the various municipalities be directed to a state of affairs which cannot be regarded as other than serious. We recognize that it is a question which must be taken up and dealt with by the municipalities and must be grappled with at close range. We are also convinced that it must be dealt with aside from the general milk supply, for education is equally as important as safe milk and proper feeding. This has been the experience of other cities like New York and Rochester, and in the Copenhagen regulations it will be noticed a sharp distinction is drawn between the general and the infants' supply. If further proof were needed it is found in the fact that Ottawa, with perhaps the best general milk supply of any Ontario city, has the highest infantile mortality. In the case of Ottawa it must of course be remembered that there is a population of dual nationalities. Montreal, a neighbouring city under somewhat similar racial conditions, has an infantile mortality of 270 per thousand, compared with 216 in Ottawa.

With the exception of the very recent steps already noted in Toronto and Hamilton, we regret to find that practically no attention has been paid to the question in Ontario cities. The figures themselves, the records which tell the story, are treated as a mere formality. Under the Act of 1896, they are received by the Division Registrar, who is usually the City Clerk, and at stated intervals they are forwarded to the office of the Deputy Registrar General at the Parliament Buildings for the annual report, which cannot be issued until all the returns are in, which generally takes considerably over a year, sometimes two. Hence they frequently do not come to the attention of the local health authorities until it is too late for them to be of more than academic value. It will therefore doubtless be a matter of surprise as well as pain to the majority of people, as it was to your Commission, to find that the records of Ontario do not compare favourably with other places.

ACT ACCORDING TO LOCAL CONDITIONS.

If this heavy infantile mortality is worth diminishing, and it is; if this heavy infantile mortality can be diminished, and all experience shows it can; then it would first seem incumbent on local health authorities to study local conditions. In the doing of this some changes may be found necessary in the system of statistics to make their usefulness more what it should be in an up-to-date city. Birth and death returns should be carefully watched, increases and decreases noted, and causes ascertained as far as medically and humanly possible. In most cases it will doubtless be found that the heaviest toll takes place in the hot summer months and that the difference between a reasonably normal and a shockingly abnormal infantile mortality is caused in July and August by diarrhoeal and kindred intestinal diseases which are caused by improper feeding when milk constitutes almost the only food. If this is found to be the case, then provision for a pure milk supply is imperative. Whether that provision is voluntarily offered by philanthropy,

as in the case of the Pure Milk League and J. Ross Robertson in Toronto, the Hamilton Milk Commission and Nathan Straus in New York, or whether it is undertaken or aided by the municipality, is a matter of detail. It seems clear that the responsibility should rest with the municipal authorities for the safeguarding of the lives of its population. Especially in the smaller cities it is a matter of only a few hundred dollars and the results more than justify the expenditure. Financial considerations should not be placed in the balance against human life, even though it be infant life. Surely there can be no nobler opportunity for philanthropic or civic endeavor.

TWENTY-FIVE PER CENT. MEANS OVER 2000.

While consideration in the present instance has been confined to cities, where infantile mortality is higher than in suburban sections because conditions of life as a rule are not so healthful, it is to be feared that the rate outside of cities is also much too high. In 1908 there were 8662 deaths in the Province under one year, including still-births. It will readily be seen that in seeking to diminish these, organized effort can be best concentrated in the larger centres of population. It is quite conceivable, however, that arousing intelligent interest and action on this question in the cities must redound to a degree to the advantage of towns and rural communities as well. A higher knowledge and a broader sympathy with the subject would result in a general uplift and better living. It should diminish grief and suffering and reach out for a betterment of the homes of the Province, which, in the final analysis, are the objective of all endeavour and of all governmental effort. To bring about a reduction of twenty-five per cent. seems not an extravagant hope and such a reduction would mean a decrease of over two thousand infant deaths each year. Especially in this Province of resources, where a premium is placed on population, to save two thousand lives a year is an ambition splendidly worth while.

CHAPTER IX.

Being Conclusions and Recommendations laying down Clean Milk, Promptly Chilled, from Healthy Herds as the Ideal for the Province and Urging Co-operation in Working for its Achievement.

In the foregoing pages we have endeavoured to set forth the importance of the milk question from the financial standpoint and from the more important viewpoint of public health. We have recorded in concise form the nature and working of present provincial and municipal legislation on the subject, and have sought to give some idea of conditions which prevail under such legislation. Side by side with Ontario legislation and experience, we have placed something of the legislation and experience in cities and states of other countries. As an important phase of the general problem, we have presented the relationship of impure milk to infantile mortality and have brought to the attention of Ontario the story of the splendid efforts which have reduced this mortality in other places, with a view to showing the need for similar efforts in this Province. From every side we have sought and welcomed, and to some extent set forth, opinions on all phases of this many-sided question. Having regard therefore to all these facts, we beg to respectfully submit the following conclusions and recommendations:

That the present laws governing the production, care and distribution of milk for human consumption are cumbersome and ineffective and should be consolidated and amplified.

That the general principles governing the production, care and distribution of milk for human consumption should be fixed by the Legislature.

That inasmuch as the administration of such laws is and must remain in the hands of the municipalities, such amplification should be in the direction of giving municipal authorities larger powers of licensing and supervision.

That a general definition of adulteration should be adopted, but that municipalities should be given power to fix a standard of food value, said standard to be not less than three per cent. butter fat and twelve per cent. solids.

That in the interests of public health and common decency more attention should be paid to the cleanliness of stables and healthfulness of cattle, and to this end the consuming municipalities should be empowered to make inspections at the sources of supply and be urged to appoint veterinarians to act in conjunction with the medical health officer.

That with a view to lessening the alarming infantile mortality in the Province, municipalities should be empowered to establish and maintain or assist in the establishment and maintenance of infants' milk supply depots.

That firm measures should be taken to combat the ravages of tuberculosis, which constitutes a serious menace both to the bovine and human species; and that as an initial step, along with an educational campaign, all cows suffering from tuberculosis of the udder or showing clinical or phy-

sical evidences of the disease, or whose milk is shown by bacteriological or microscopical examination to contain tubercle bacilli, should be promptly removed from dairy herds.

That pasteurization is not a provincial ideal, but may be a municipal expedient if carried out in accordance with proper scientific regulations.

That in cities of over 50,000 population no milk should be sold in shops except in bottles or other sealed packages.

That cans, bottles or other utensils used in handling milk should be used for no other purpose and should be promptly rinsed by the consumer on being emptied.

That producer, distributor and consumer should alike be educated to the importance of cleanliness in handling milk and to the value of prompt chilling and keeping in a cold place.

Before giving in detail reasons in support of the points and principles involved in the recommendations above outlined, we beg to say that we believe them to constitute a simple, practical and workable solution of the question. Realizing that all reforms are matters of evolution, we have avoided the path of the extremist. We have refrained from the not uncommon device of painting a dark and horrifying picture in order to shock public opinion to interest and action. The subject we conceive to be rather one for hearty co-operation than hysterics. Accordingly, we have approached it with a clearness of vision unbefogged by fads, an openness of mind untainted by prejudices, a singleness of purpose concerned only for the safety of our people and the ultimate credit of our Province. In the working out of the problem many important interests are vitally concerned. We have sought not to place any one interest on a vantage ground from which to war on any other interest, but rather to arrive at a common basis on which all interests—dairyman and health authority, sanitarian and bacteriologist, distributor and retailer, producer and consumer—may unite for the advantage of all. A higher standard of cleanliness and care must be the ideal of future work and legislation, and co-operation is the only means by which it can be attained.

SHOULD BE ONE PLAIN PROVINCIAL LAW.

In affirming that the present law with respect to milk for human consumption is cumbersome and ineffective, attention is directed to the fact that the various clauses dealing with the matter are scattered over several different statutes, whereas the law governing milk for manufacturing purposes is comprised in one clear and concise Act. Furthermore, it is ineffective because it is difficult, if not impossible, to enforce either inspection or the clause against adulteration. While the health officer may make inspections at the source of supply, he cannot enforce improvements without the concurrence of the health officer of the township in which the dairyman is located. As the township health officer, generally speaking, has no special interest in the matter and is not paid for the extra demands that would be made on his time, the working of this law is farcical. Although, as seen in preceding pages, many municipalities have inspection clauses in their by-laws, the enforcement, with rare exceptions has been confined to vendors within the city limits or has been extended to the farm in a purely perfunctory manner. Doubtless owing largely to the confusing multiplicity of clauses, no attempt has been made to take advantage of the Act of 1908, enabling the Minister of Agriculture to appoint an inspector to visit the farms supplying cities. No further proof is needed that this phase of the law as it stands at present is cumbersome and ineffective.

As to adulteration, a similar result is seen from the fact that very few convictions have been obtained under the clause which makes it essential to prove that the milk was "knowingly and fraudulently adulterated."

Being therefore both cumbersome and ineffective, we are forced to the opinion that, instead of tampering with and amending, the present clauses should be wiped out and in their place substituted one plain and comprehensive Act which would cover all relevant points. Such an Act is on the statute books of many States of the Union across the line, and such an Act was passed by the Legislature of Victoria Colony, Australia, in 1906, and was given the gold medal at the International Food Congress at Paris as being the most complete enactment on the subject. Such a law, in our judgment, should embody a general provincial policy, but should also clearly define the powers of the municipalities, in whose hands the administration must largely rest as in the past.

ENACT MINIMUM STANDARD FOOD VALUE.

In the formulating of such a law, we believe municipalities should be given authority to fix the standard of butter fat and total solids of milk to be sold within such municipality, but that a provincial definition of adulteration should be adopted as follows:

- Milk containing more than eighty-eight per centum of water or fluids;
- Milk containing less than twelve per centum of milk solids;
- Milk containing less than three per centum of fats;
- Milk drawn from animals within fifteen days before or five days after parturition;
- Milk drawn from animals fed on distillery waste, or any substance in a state of fermentation or putrefaction, or on any unwholesome food;
- Milk drawn from cows kept in a crowded or unhealthy condition;
- Milk from which any part of the cream has been removed;
- Milk which has been diluted with water or any other fluid, or to which has been added, or into which has been introduced, any foreign substance whatever;

Milk, the temperature of which is higher than fifty-five degrees Fahrenheit.

This follows the lines adopted by New York and other States of the neighbouring Republic. It will be noted that it includes a minimum standard of three per cent. butter fat and twelve per cent. total solids. Natural milk as drawn from the cow invariably averages around 3.5 per cent. butter fat and 12.5 total solids. J. A. Ruddick, Dairy Commissioner at Ottawa, in his latest report, submits the following table showing the average production of 1,373 cows for full period of lactation in four provinces:

Province	No of cows.	Average yield of milk.	Average test.	Average yield of fat.
Ontario.....	541	5,832	3.5	205.7
Quebec.....	401	4,328	4.2	180.4
British Columbia ...	417	5,317	4.	210.1
Prince Edward Island	14	4,932	3.6	176.1
	1,373			
Average for four provinces.....		5,102	3.8	193.1

Out of 925 herds tested by G. G. Publow, Chief Dairy Instructor for Eastern Ontario, only five went below three per cent. In some localities it is easier to get a higher standard than in others, and hence it is thought well to give the municipalities some discrimination. In our enquiries in the cities and towns of Ontario, we have found that the food quality of the milk has been very satisfactory, with the exception of Toronto, where forty per cent. of the samples have tested below three per cent., which fact must be largely attributed to adulteration. It will be seen, therefore, that a minimum standard offers no hardship to the honest dairyman, and it is intended only to offer hardship to the dishonest dairyman. It offers the only possible power by which Toronto or any other city may protect itself against wholesale and repeated adulteration. In the case of creameries and cheese factories, a standard is not so necessary, because the milk is delivered direct from the farm to the factory. If the milk is found to be lower than is regarded as natural, a man is sent by the factory direct to the farm to make tests of the milk immediately after it is drawn from the cows. In this way over one hundred prosecutions have been made during the past summer with good results. But it would be impossible to carry out this plan in the case of a large city, for the simple reason that the milk is handled by three or four different persons between cow and consumer. The only effective plan, we are convinced, is to adopt a minimum standard and hold the vendor responsible for the article he sells, just as the vendor is responsible for any other class of goods. It would then be the duty of the retailer to see that he got unadulterated milk from the farmer and the consumer to see that he got unadulterated milk from the retailer. Against a minimum standard, it is urged that as natural milk averages about 3.5, a standard of 3.0 would be a temptation to dealers to quietly extract the extra percentage and still keep within the law. To this it is only necessary to point out that, under the clause suggested, such a course would constitute adulteration just as certainly with a standard as without it. The standard is in no sense a handicap and is in every sense a safeguard.

MORE SYSTEMATIC INSPECTION NEEDED.

While the question of the richness of the milk has been the most prominent one in the past with the consumer, it is not necessarily the most important. It is even more important that milk should be pure and wholesome and should be produced and handled in a clean and sanitary way. To secure this, we believe every city and town should have a system of thorough inspection, carefully enforced. For very obvious reasons, it is desirable that such inspector should be a veterinarian, and, as an indication of the growing importance of this work, it may be noted that a special course in dairy inspection has recently been included in the curriculum of the Ontario Veterinary College. Wherever possible, it is strongly advisable that a man should be employed who could give all his time to the work, and therefore be free from outside influence, but it is recognized that this is not possible in the case of the smaller cities and towns. For their benefit, we beg to say that the practice of employing a veterinary to do the work in a portion of his time has been followed in some parts of the Province by good results, despite its disadvantages.

In support of the principle of inspection, little need be said. Its wisdom is admitted in legislation as it is proven in experience. Inspection has long been recognized as one of the primary essentials in effective government. Hence, we have inspection of schools and of legal offices, of factories and bakeshops. It is being

developed more and more by modern thought each year in the protection of property and the safeguarding of human life, and in the larger cities it is now impossible to even run an elevator without having it frequently passed by an inspector. As regards milk, the principle of inspection of vendors and farms is now recognized in the statutes of Ontario, as indeed it is recognized in a greater or lesser degree in the statutes of almost every other civilized country. But in Ontario, at least, it has been for the most part only perfunctorily enforced as regards vendors, and scarcely at all as regards the sources of supply. Yet is it not as important to supervise the source of the supply of the milk we drink as to supervise the source of the supply of the bread we eat? Are not the invisible, insidious germs which milk may convey as great a menace to the health of thousands of consumers as the whirring, crushing machinery to the hundreds of employees of the factory? Inspection cannot do everything, but it has been proven that inspection does do much.

CIVIC CONTROL OF MILK SUPPLY IS BEST PLAN.

Admitting the principle, therefore, what of the plan? Inspection to be of value must be thorough, must be systematic, must be backed by authority. How then can it be most effectively accomplished? We have no hesitation in saying that it can be best accomplished by each municipality looking after its own supply, and inasmuch as the responsibility is already on the municipality to protect its citizens, we believe they should be given authority commensurate with their responsibility. We would strongly recommend that every city and town be given the utmost freedom to make inspections at every stage from the cow to the consumer, and should have power to keep out of their municipality any milk believed to be contaminated. At present, consuming municipalities have partial inspectoral powers, but their hands are tied; we would urge that the tether be cut, and we are confident such freedom would not lead to friction any more than the freedom of the average man incites him to quarrel. Local autonomy was the argument at the basis of the "crazy quilt patch work" amendment of 1900, by which the officers of both municipalities concerned must go together and concur. The results of that policy should be sufficient condemnation. Furthermore, it is absurd to expect a township, for instance, to go to the trouble and expense of maintaining a system of inspection for the benefit of a neighbouring city. We respectfully submit that it is not a question of municipal rights; it is a question of buyer and seller. If it were possible for the individual consumer of the city to go to the producer in the country and say "if certain simple regulations are adopted, I shall purchase from you," no possible objection could be raised. That would merely be a matter of agreement between producer and consumer, between seller and buyer. Moreover, it would be merely what is done every day here in Ontario by the big dairy companies of the larger cities and by our condensing factories, who send inspectors regularly to the farms. It is not possible for the individual consumer to take these precautions to protect himself, and so in our system of governmental organization the responsibility of protecting the individual in such matters has been placed on the body corporate, which in turn has appointed a health officer for this purpose. This recommendation therefore resolves itself merely into giving the municipalities machinery to adequately discharge the responsibility imposed on them. That they are anxious to do the work is shown by the practical unanimity of view expressed by health officers in preceding pages.

PRECEDENTS IN ONTARIO AS WELL AS ELSEWHERE.

But sound and unassailable as is this proposition in theory, it is equally sound and unassailable in practice and in precedent. Reference has already been made to the fact that a few municipalities, notably Ottawa and London, have already adopted such a system of inspection with the consent of the dairymen, and it is not necessary to go farther for an illustration of the splendid results to be achieved. We have shown also that the principle of civic control of the milk supply is exercised across the line not only by Rochester, Syracuse, New York, Chicago and Detroit, which we visited, but also by practically every other city in the United States. The same principle is cleverly embodied in the model Dairy Bill of Victoria Colony, previously mentioned. In this Bill the city and all the farms supplying milk thereto are constituted a "milk area," and an officer is given jurisdiction in that milk area. The following clause will illustrate:

"The municipal district of Ballarat and Ballarat East together with the whole of the premises of each and every dairy farm or dairy outside such municipal districts wherever situated from which milk is sold within any of such municipal districts shall constitute a milk area and be called the Ballarat Milk Area."

But fortunately we need look no farther than the Ontario Statutes for precedents in this matter. Although it has never been put into actual practice, "The Milk, Butter and Cheese Act of 1908" gives towns and cities the right to appoint inspectors with the approval of the Minister of Agriculture, as the following quotation from clauses 13 and 14 will show:

"Upon the recommendation of the Minister of Agriculture, the Lieutenant-Governor-in-Council may appoint one or more persons as inspectors for the enforcing of the provisions of this Act, who shall be known as Dairy Inspectors. The Lieutenant-Governor-in-Council may determine the remuneration to be paid to such inspectors. All dairy inspectors appointed under this Act shall have free access and admission to all cheese factories and creameries and premises upon which milk or cream is offered for sale located within the Province and to all lands adjoining the same, and to the premises of all persons supplying milk or cream to any cheese factory or creamery, or for sale in cities, towns or incorporated villages," etc.

In recognition of the same principle and the same necessity, the following clauses from the same Act are of importance:

"The owners or board of management of any creamery in the Province of Ontario may make such rules and regulations as may be advisable for the due carrying on of the business of the creamery.

"The patrons of all creameries may be required to subscribe their names to such rules and regulations, and the rules and regulations shall be binding on the patrons, owners and board of management who have so subscribed."

In thus according to the manager of a cheese factory the right to inspect at the source of supply, all quibbles about "municipal rights" are effectively disposed of. With the wisdom of the Legislature of 1908 in this regard, we heartily concur; but we believe that it is equally as wise that cities and towns should have the same authority as managers of cheese factories. The motive which prompted extending this supervision for cheese factories was commerce; the motive which

impels us to urge similar supervision for municipalities is human health; and we do not think that the Legislature can afford to affirm that commerce is of more importance than human life and health.

Thus, in this recommendation we do not rely on theories or foreign precedents, sound though they be; we seek merely to give vitality and working form to the precedents and principles already laid down by the Legislature of this Province.

SCORE CARD SYSTEM, CLEANLINESS, COLDNESS.

From the principle and plan of inspection, it is pertinent to pass to the points to be observed and the benefits to be aimed at in that regard. In this connection, we heartily commend the score card as admirably adapted to systematize the work, facilitate record keeping and simplify effort, both from the standpoint of the inspector and the inspected. A copy of a score card will be found in the appendix. Under it, various points are given for cleanliness, ventilation, water supply, healthfulness of cattle, and so forth, making a total possible of one hundred. It has been found in some places that a high score has a real commercial value by enhancing the price and securing a better market, and in Western Ontario a graduate of the Agricultural College stated that he was able to get better prices for his milk by having a reputation for sanitary care.

Whatever the system, first prominence should be given to the importance of cleanliness and coldness at every stage in the handling of milk. About this there is nothing new or novel. Science, in showing the dangers of contamination and demonstrating the influence of temperature in developing bacteria, has illuminated the need for care and emphasized the value of ice; but even before science supplied the explanation, it was recognized that milk should be handled carefully and kept cold. At the same time we are convinced by what we have seen in all parts of this Province that there is still considerable room for improvement in this regard on the part of all concerned. We are not disposed to exact conditions which might be criticized as "fads," but it should always be remembered that milk is a food for human consumption and it should be handled accordingly. We believe that every dairy barn should be lime-washed repeatedly and that the practice of removing the dung to at least fifty feet from the barn, or, better still, spreading it on the fields, should be more generally adopted. There should be no stagnant pool or other objectionable nuisance in the barnyard. A little attention to draining and grading the barnyard will remove the conditions of mud and manure through which cows often have to wade to get to the stable and which renders it difficult to keep the animals clean. The stable should preferably be of cement floor, for that is more easily kept clean and free from objectionable odour arising from soakage; but, equally important, it should have plenty of sunlight and ventilation. The hind quarters and udders of the cows should be clipped when they enter the stable for the winter, and the cattle should be brushed every day some little time before milking to secure greater comfort to the animal and prevent dirt from the animal dropping into the milk pail. In the milking the first drawn milk should be discharged, as it contains large numbers of bacteria. A small-top pail has been found to lessen the dangers of contamination from dust or particles from the cow by twenty-five per cent. The milk should be removed from the stable immediately it is drawn from the cow. Each dairy farm should be equipped with a milk house, which need not be expensive, but which should be kept clean and should be supplied with a plentiful quantity of pure cold water, or preferably ice. Especially in the summer

months, too much stress cannot be laid on the importance of prompt chilling and keeping the milk cold. Below forty-five the bacteria will not multiply; from forty-five to fifty-five, they multiply slowly; while around seventy, which milk frequently reaches before being delivered to the consumer in the hot weather, they double every half hour. It necessarily follows that the same scrupulous care as to their personal cleanliness should be exercised by those who are doing the milking or milk handling, and in no case should anyone exposed to a contagious disease be allowed to have anything to do with the handling of milk. The hands should always be washed before milking, and the practice of wetting the hands before starting or during milking cannot be regarded as other than filthy. Assuming the cows are healthy, produce the milk under conditions of absolute cleanliness, handle it with the same care, chill quickly and keep cold until used, and the problem



Impossible to get clean milk from dirty cows.

has been solved. We are firmly convinced that it is easily possible to produce good sanitary milk in the average Ontario barn without any more radical changes than strict cleanliness and prompt chilling, and these are not expensive.

TACTFUL VETERINARIAN COULD ACCOMPLISH MUCH.

It is easily conceivable that the visit of a veterinarian-inspector three or four times a year, making tactful suggestions and encouraging improvements in all lines, would have a wonderfully beneficial effect, but it is not to be expected that any revolution can be wrought in a week or a month. It must be a gradual process of education and peaceful persuasion. Tact on the part of the inspector will always accomplish more than stern authority. Two of the great difficulties to be met with are the tenant farmer and the man with the old barn. Many of these instances were observed in different parts of Ontario. The one cannot be expected

to make extensive improvements, and the other cannot be expected to pull down the old, poorly-lighted and poorly ventilated structure. A few might have to go out of the dairy business—the business of producing human food—but for the most part both can clean up their premises and make the best of their circumstances. Let it not be thought that there is contemplated any such thing as an invasion of “personal liberty.” The manufacturer may not run his factory until he has conformed to certain necessary regulations for the protection of his employees; the baker may not make his bread until he has conformed to a standard which will safeguard his consumers; the man in the city may not build a house without considering its effect on his neighbour or the health of the occupant through unsanitary conditions. A score of such illustrations could be adduced to indicate the methods by which modern society seeks to protect itself, and in their reflected



Newly constructed, recognizing the value of sunshine and ventilation.

light show the reasonableness of the suggestion that there should be similar supervision in connection with the dairy business, which comes so closely in touch with everyone. Furthermore, we believe the intelligent and progressive farmers and dairymen appreciate the benefits which informed and informing inspection would mean to them. In those sections where it has been carried on systematically, it is not only not resented, but welcomed, and we are glad to bear testimony to the splendid manner in which farmers are co-operating with health officers and veterinarians for improved conditions. We desire to see this co-operation extended to all parts of the Province with the same excellent results. But we would like to lay stress on the fact that the work must be carried on in a spirit of co-operation rather than by antagonistic authority. For the intelligent and progressive farmer who is honestly doing his best, there should be every assistance and encouragement; for the man who by persistent and deliberate carelessness gambles with the health and perhaps the lives of his customers and their children, there should be no more

sympathy than there is for the man who puts little apples in the bottom of the barrel and decayed ones in the centre, or the manufacturer who makes use of peanut shells to make breakfast food.

THE TUBERCULOUS COW MUST GO.

With a system of thorough inspection should be launched a strong and intelligent effort to combat tuberculosis among cattle, the ravages of which in this Province make it at once the most dreaded and destructive of bovine diseases. This aspect of the question must be considered from two standpoints—from the standpoint of the financial loss to dairymen which it annually entails, and from the more important and likewise more controversial standpoint of the loss of human life through contaminated milk.

That there is a steady annual financial loss through the wasting and death of tuberculous cows, there can be no doubt, but the amount cannot even be estimated as no records are kept. As to the prevalence of the disease, there is a wide range of opinion. Special enquiries were made. In Western Ontario, veterinarians stated that twenty to twenty-five per cent. of the cattle were diseased. In Toronto, an eminent veterinarian expressed the opinion that not more than five per cent. of the ordinary dairy cattle suffered, but that it was much more prevalent in the pure-bred cattle. In Eastern Ontario, the estimate was placed at fifteen to twenty per cent., but of a herd of 118 well bred Jerseys on a farm near Ottawa, 90 reacted to the tuberculin test in 1908, although all were splendid looking and apparently healthy animals. Of the 1978 cattle which, according to the latest report, were voluntarily tested under the supervision of the Health of Animals Branch at Ottawa as a result of the free distribution of tuberculin, 263, or about 12 per cent., reacted. Of course it is to be remembered that these were suspected of being infected and the percentage may not be representative. These figures, although necessarily only estimates, will give some idea of the magnitude and seriousness of the problem. With 1,075,496 milch and 1,595,088 other cattle in the Province according to the figures of 1909, even the lowest estimate of five per cent. means there are over 125,000 more or less tuberculous animals. It is to be feared, however, that the true total would be nearer double that number. From the point of view, therefore, of the dairy and beef industry, strong and intelligent steps should be taken to curtail the ravages of bovine tuberculosis.

TUBERCULOSIS FROM CONTAMINATED MILK.

We, however, are chiefly concerned with the question of the danger of tuberculosis from contaminated milk, and are first confronted with the old scientific controversy—"is bovine tuberculosis communicable to man?" If it is not, the matter is easily disposed of, but if it is, then there is a grave situation to be faced, and faced candidly.

It is not necessary here to go at any great depth into the intricacies of the controversy which has raged in the scientific world for some years past. The story may be briefly told. Tuberculosis is not hereditary, but a person may inherit a predisposition to it. There are two schools of thought—one maintaining that tuberculosis is almost entirely caused by "inhalation," that is, by breathing in germ-laden air; the other maintaining that a large percentage is caused by "ingestion," that is, the germ being taken into the digestive tract with tuberculous milk or other products. Prof. Robert Koch, the eminent German scientist, is the chief exponent

of the first school; Von Behring, another eminent German scientist, is the chief exponent of the second school.

But the controversy has largely hinged on the statement of Koch in 1901. When he discovered in 1882 that tuberculosis was caused by a germ, he also expressed the view that the bacilli were the same in the bovine and human species. This was accepted as authoritative until Koch startled the scientific world in 1901 with the statement that the disease was different in man and cattle, and therefore was rarely, if ever, communicable, and there was no need for preventing the use of products of tuberculous animals for food. This was not so readily accepted. Instead, the German and British Government both appointed commissions composed of their leading scientific men to carry on independent enquiries. These commissions pronounced against the Koch view. Of 56 different "cultures" examined by the Ger-



Tuberculin-tested herd from which milk is sold profitably at five cents a quart.

man Commission, 6, or over ten per cent. were held to be of bovine origin. Of 60 cases investigated by the British Commission, 14 were declared to be of bovine origin. Invariably the cases were found among children. The British Commission in its Interim Report in 1907, the latest such utterance on the question, said:

"There can be no doubt but that in a certain number of cases the tuberculosis occurring in the human subject, especially in children, is the direct result of the introduction into the human body of the bacillus of bovine tuberculosis; but there also can be no doubt that in the majority at least of these cases the bacillus is introduced through cows' milk. Cows' milk containing bovine tubercle bacilli is clearly a cause of tuberculosis and of fatal tuberculosis in man. Of the 60 cases of human tuberculosis investigated by us, fourteen of the viruses belonged to Group I., that is to say, contained the bovine bacillus. If, instead of taking all these sixty cases, we confine ourselves to cases of tuberculosis in which the bacilli were apparently introduced into the body by way of the alimentary canal, the proportion of

Group I. becomes very much larger. Of the total sixty cases investigated by us, twenty-eight possessed clinical histories indicating that in them the bacillus was introduced through the alimentary canal. Of these, thirteen belong to Group I. Of the nine cases in which cervical glands were studied by us, three, and of the nineteen cases in which the lesions of abdominal tuberculosis were studied by us, ten belong to Group I. These facts indicate that a very large proportion of tuberculosis contracted by ingestion is due to tubercle bacilli of bovine source. A very considerable amount of disease and loss of life, especially among the young, must be attributed to the consumption of cows' milk containing tubercle bacilli. The presence of tubercle bacilli in cows' milk can be detected, though with some difficulty, if the proper means be adopted; and such milk ought never to be used as food. There is far less difficulty in recognizing clinically that a cow is distinctly suffering from tuberculosis, in which case she may be yielding tuberculous milk. The milk coming from such a cow ought not to form part of human food, and, indeed, ought not to be used as food at all. Our results clearly point to the necessity of measures more stringent than those at present enforced being taken to prevent the sale or consumption of such milk."

In spite of the fact that he is in the minority, Koch has not yet entirely receded from the position he took in 1901, but is still experimenting. At the International Congress on Tuberculosis, held in Washington in 1908, he made it clear in the presence of the most eminent scientists of the world that he still believed that bovine tuberculosis was rarely transmitted to man and then only to infants. His views were voiced in the following words, as reported on page 754 of the Official Report:

"I would again call attention to the fact that human tuberculosis is the principal point of attack, because eleven-twelfths of the patients perish through this type of infection. I admit that bovine infection can occasionally occur, and I desire not to be understood as disregarding the endeavour to extirpate bovine tuberculosis as far as these endeavours are dictated by agricultural and economic reasons. But I mean that it would be wrong to give these proposals the leading place in front of the efforts to combat human tuberculosis."

Along with the Koch view is to be taken the fact that in Japan, where there are few cows, tuberculosis is rampant and in Cuba, where there is no bovine tuberculosis, as related on another page in the experience of Louisiana State, yet the same prevalence exists. At the same time it must be borne in mind that the great majority of the most eminent scientists declare the disease is transmissible; and British and American legislation, not to mention other countries, is shaped to combat that transmissibility.

PREVALENCE OF BOVINE BACILLI IN HUMAN BEINGS.

Admitting the transmissibility, therefore, your Commission are strongly of the opinion that steps should be taken to protect the people of this Province from the dangers of contaminated milk. As to the extent of this danger, we made some enquiries. Dr. W. H. Park, the eminent authority on bacteriology in New York, stated that, roughly, 1.6 to 3% of all the deaths from tuberculosis in New York City was due to bovine origin, and that twenty per cent. of the tuberculosis of infants is of bovine origin. He had found no bovine bacilli in adults. Dr. G. W. Goler, of Rochester, who has been making some experiments of his own, declared that fifteen per cent. of the tuberculosis among children was of bovine origin. Dr. J. G. Rutherford, Veterinary Director General for the Dominion, declared that it

was admitted that at least seven or eight per cent. of the cases of tuberculosis were of bovine origin, and his own opinion was that the percentage was a great deal higher.

It must be remembered, of course, that every tuberculous cow does not give tuberculous milk. Fortunately, only cows which have tuberculosis of the udder or of the glands will impart the bacilli with the milk. Veterinarians agree that there is not more than one or two per cent. of the cows of this Province which have tuberculosis of the udder or glands. But the insidious nature of the disease is such that it is impossible to tell when it may spread from other parts to the udder and thereby get into the milk. There is an additional way by which the milk may become contaminated, and that is, by reason of the excreta from a tuberculous cow or the contaminated stable dust dropping into the milk through careless handling. In this connection, E. C. Schroeder, M.D.V., one of the experts of the Washington Bureau of Animal Industry, has found that the average cow passes thirty pounds of excreta a day, and this would contain 37,800,000 tubercle bacilli. Hence, the presence of a tuberculous cow in a stable is a menace to some extent, slight or otherwise.

METHODS USED IN OTHER COUNTRIES.

The tuberculin test, introduced by Koch in 1890, has been the most potent factor in the fighting of bovine tuberculosis. To some extent or other it is now almost universally used and is recognized as the most reliable diagnostic agent. The great problem has always been, what to do with the cattle which react, in order to avoid heavy loss. In Denmark, Prof. Bang has introduced the plan of keeping the reactors separate from the rest of the herd and using them for breeding purposes, boiling the milk before feeding it to calves or other stock. This has had good results in Denmark and has been adopted with partial success in other countries. In this connection it is important to read the words of Prof. Thomas Carroll, in an address at the Anti-Tuberculosis Congress in Ireland in 1908. He said:

"It is to Denmark we must look for the greatest reduction in deaths during these thirty years, and there can be little doubt now that this reduction was due to the exertions of Prof. Bang, to the measures taken by the Danish Government to materialize Bang's suggestions, and to the great amenability of the Danish farmers to the influence of their scientific men that works through the governmental departments. We can learn a lesson from Denmark that even in public health co-operation may be a great aid. It is perfectly clear that the important decrease in human tuberculosis in Denmark was coincident with the measures taken for dealing with tuberculosis of the animals of the farm. It has also been made evident that much improvement is due to the spirit of co-operation and helpfulness which exists in that country."

In England, reliance is placed on the physical and clinical test, and no cow suffering from tuberculosis of the udder or in which tuberculosis can be detected by emaciation or a general examination is allowed to be in a herd supplying milk for human consumption. In addition, many cities make bacteriological examinations, and any milk found to contain tubercle bacilli is followed up and the herd submitted to the tuberculin test.

In the United States, the educational influence of the Federal Government has been thrown on the side of a general application of the tuberculin test and a

few State Governments have granted compensation. Compulsory tuberculin testing has also been exacted as a condition of supplying milk to the following cities: Minneapolis, St. Paul, St. Cloud, Alexandria, Duluth, Mankato, Litchfield, Willman, Albert Lea, Winona, and Montclair, N.J., the latter place being now the scene of an elaborate legal and scientific test case on the question.

In Canada, about half a dozen towns and cities also demand the tuberculin test. In Manitoba an amendment was passed in 1902 giving towns and cities the right to insist on the tuberculin test, and Portage la Prairie, Stonewall and Neepawa have taken advantage of it. According to figures on file at the Health of Animals Branch at Ottawa, of 444 tests made at Portage since 1904, only 7 reacted and 3 were found suspicious; of 291 tests made at Neepawa since January, 1908, 36 reacted; of 47 tested at Stonewall, 4 reacted and one was suspicious. In



Damp, dark stables like this develop tuberculous cattle.

addition, of 772 tested at Calgary, 44 reacted, while at Moncton, N.B., of 1,480 tested since 1905, only 22 reacted and 10 were suspicious.

In Ontario, practically nothing has been done in recent years.

CALL FOR PREVENTIVE MEASURES WHICH WILL PREVENT.

With these facts and conditions staring us in the face, it is clear that something more should be done in this Province. What lines promise most effective results? It is, of course, to be remembered that this work at present comes under the jurisdiction of the Health of Animals Branch at Ottawa, and it is encouraging to know that Dr. Rutherford, head of that Branch, is Chairman of an International Committee of experts who are now deliberating on the subject and who are expected to evolve a practical plan. In the meantime, we are of opinion that the

provincial and municipal authorities should at least safeguard the milk supply for human consumption. While probably nothing short of a general tuberculin test will completely eradicate the disease from the dairy herds, we are aware that the compulsory application of this test throughout the Province at the present time would not be a practical policy, although of the opinion that at no distant date power should be given municipal councils to enact by-laws for the tuberculin testing of dairy cattle supplying milk to the municipality and for the removal from the dairy herds of all those reacting. It is difficult to persuade dairymen to remove five or six possibly dangerous cows to secure protection from one certainly dangerous. In other words, while ten or twelve might react to tuberculin, only one or two might be giving actually contaminated milk. But point out a cow undoubtedly diseased and undoubtedly giving contaminated milk, and its retention would be too abhorrent to be thought of for a moment.

In 1896 an attempt was made, as shown in our review of the laws, to give local boards of health power to enact by-laws requiring tuberculin testing, but the opposition was so strong and continuous that the enactment was of no practical value for reasons hitherto explained. We have, therefore, endeavoured to confine ourselves to a moderate recommendation, in the hope that something of real value will be done. We believe a start should be made along the lines of the British plan by absolutely excluding from dairy herds all cows suffering from tuberculosis of the udder or showing any physical signs of the disease, or whose milk on examination is shown to contain tubercle bacilli. This will not remove all tuberculous cows, but it should remove the most dangerous, and will be a step in advance. This work could be conducted as part of a system of inspection by a veterinarian.

But an equally important factor in the eradication of tuberculosis would be the improved sanitation which a system of rigid inspection would usher in. There is no doubt but that one of the most potent causes of the disease in this Province is the low, dark, close, foul-smelling stables in which the cattle are housed. There is equally no doubt but that one of the most potent enemies of disease is fresh air and sunshine. Anything that will improve the light and ventilation will go a long way to improve the health of the animals. The tuberculous cow must go.

SHOULD ALSO GUARD AGAINST OTHER DISEASES.

There are other diseases which unfortunately sometimes lurk in the milk supply. Of these the chief are typhoid fever, scarlet fever and diphtheria. Several health officers throughout the Province informed us of epidemics which within their experience had been traced to the milk supply. John W. Trask, of the Public Health and Marine Hospital Service in Washington, has compiled a long list of milk-borne epidemics extending over a period of years, which throws some light on the question of prevalence. His list of milk-borne typhoid epidemics aggregates 179, and includes 107 in the United States, 43 in Great Britain, 23 in Europe, 3 in Australia, 1 in New Zealand and 2 in Canada. Scarlet fever epidemics number 51, 25 in the United States and 26 in Great Britain; diphtheria epidemics aggregated 25, 15 in the United States and 8 in England. The history of each epidemic is given, showing the trail of the disease along a milk route and showing also that as soon as the supply was stopped, the epidemic stopped. Some authorities estimate that twenty-five per cent. of typhoid is milk-borne.

These figures indicate a seriousness which warrants a demand that all reasonable precaution should be taken to safeguard the supply and a stipulation to this

effect should be embodied in any new legislation. None of these are bovine diseases, and hence their dissemination through milk is the result of outside contamination, although diphtheria has been known to be caused by a diseased udder or diseased teats. The most frequent means of infection, however, is from a person suffering from one of the diseases milking or handling the milk, from a person who is nursing or otherwise in contact with a victim of the disease milking or handling the milk, or from polluted water being used in the washing of cans or bottles. In fact it is sometimes carried by a milk bottle being taken from a house where the infectious disease prevails.

All these things call for precautionary measures of the strictest nature. It should be made an offence for anyone suffering from a contagious disease to handle milk in any way, and close attention should be directed to see that all cans and utensils are absolutely sterilized, instead of being merely rinsed with lukewarm water as is too frequently the case.

TRANSPORTATION AND RETAILING.

It will be seen that the danger of contamination from infectious diseases exists to almost as great an extent after the milk leaves the farm as before. For this and other reasons equally obvious, no system of supervision is complete which does not include the matter of transportation and vending. At present consuming municipalities have powers of inspection within their territorial limits, and in future legislation we believe this feature should be retained and its usefulness extended. There can be no doubt but that, especially in the larger cities, a great deal of contamination and high bacteria counts are attributable to careless handling after the milk leaves the producer. Especially in the larger cities, where 24 to 36 hours elapse before the milk reaches the door of the consumer, there is ample time and opportunity for contamination unless strict supervision is exercised. An effort should be made to keep the temperature below 55 degrees, in doing which a mineral wool wet blanket over cans packed in ice will be found useful; to maintain strict cleanliness at the premises of the retailer, and to see that the sterilizing of cans and bottles is effectively done. This should also be systematized by use of a score card, for a constant and through supervision in transit is as important as at the source of supply.

In this connection, we believe that it should be made an offence to use a milk bottle or can for any purpose other than that of milk container, and we would strongly urge that bottles and cans should be rinsed in cold water as soon as emptied. A recital of some of the uses to which milk bottles and cans are sometimes put would prove disgusting. It is a simple matter to rinse them with water as soon as emptied or leave water standing in them until collected, and the effect is of material assistance in sterilizing and means an important step towards cleanliness. The ideal milk container is one so inexpensive that it can be thrown away immediately after being used and perhaps before long inventive genius will make this possible.

Another factor in the distribution of milk is the shop, and this appears to us to be the weakest link in the entire modern chain of milk distribution. While, fortunately, only a comparatively small portion of the milk is sold in this way, it cannot be denied that in hot weather it is sold under the worst possible conditions. Surrounded frequently by vegetables, fruit, fish or other merchandise and frequently exposed to a germ-laden atmosphere, it is not surprising that the bac-

teria should always be counted in the millions. We believe it would be a distinct improvement in the larger cities of the Province to provide that milk should be sold in shops only in bottles, except in shops restricted to dairy products. This plan has been adopted in Chicago, Syracuse and other cities with good results and is being adopted in Boston on the first of May next.

As a means of keeping milk vendors up to the standard, a few of the smaller cities have found the publication of the tests to be of a very material assistance, being more effective than fines and prosecutions. We believe municipalities should be confirmed in the use of this beneficent publicity.

It does not seem to us practical to fix a bacteria standard for the Province, but we are convinced that a bacteriological laboratory and bacteria tests would be found, by the larger cities at least, to be a distinct aid in the supervision of the milk supply. While it might not be found practical to fix an arbitrary standard for bacteria, it would be found that the number of bacteria constituted a reliable index to the cleanliness and care exercised in handling the milk. At present Boston has a municipal standard of 500,000 per cc., Rochester of 100,000, and a few other places of 100,000. New York has a standard of 1,000,000, but found it unworkable and modified it to provide that milk should not contain "an excessive number." This great disparity indicates the difficulty of fixing a standard and is due to the fact that a million of certain kinds of bacteria may be less harmful than a few of certain other disease-producing types. Furthermore, dirty milk kept cold would show a lower count than clean milk kept at a higher temperature. Another point to be borne in mind is that the different "media" used by different bacteriologists in making the counts produces different results. In a general way, however, it would appear reasonable that milk with a count of a million would contain more pathogenic germs than milk with a hundred thousand. A laboratory would keep a city informed on these points; and repeated high counts, or the discovery of tubercle or other pathogenic bacilli, would point to the source of trouble, which might be easily remedied. Of twenty samples tested for your Commission, we found the counts of milk from various parts of the Province ranged from 50,000 to 75,000,000 per cc.

PASTEURIZATION NOT AN IDEAL, BUT MAY BE AN EXPEDIENT.

In preceding chapters there is much evidence to show that the process known as pasteurization has received very considerable attention from your Commission. As this process is being advanced to-day by some as the absolute and by others as the partial solution of the problem of a safe milk supply, we took advantage of every opportunity offered, either by personal experience or literature, to possess ourselves of the most authoritative information on this question. Our study and observation impels us to the conviction that pasteurization cannot be considered as a provincial ideal, but may be found necessary as a municipal expedient. In these conclusions, we have deferred its consideration until after everything else as we believe it should be adopted only after other measures have failed.

Pasteurization is so called because it was first introduced by the eminent French scientist, Louis Pasteur. In his study of the diseases of wine around 1864, he discovered that heating would prevent souring and abnormal fermentation. A few years later the process was applied to milk. Pasteurization therefore means the heating to a point below boiling, which is 212 degrees F., but the term as applied to milk also includes prompt and rapid cooling. Getting down to a more

precise definition as to temperature and length of time, pasteurization is found to be a very elastic term. Some, we found ran milk over coils for 30 to 40 seconds at a temperature of from 165 degrees to 185 degrees and called it pasteurization; this is also known as "continuous" or "commercial" pasteurization. Others held it for from 20 to 30 minutes at from 140 degrees to 157 degrees; this is known as "scientific" pasteurization. Still others, like Chicago, have a sliding scale both of time and temperature. Some few pasteurize after the milk has been placed in bottles and thereby avoid absolutely the possibility of further contamination; others pasteurize in open vats, over coils or in closed holding devices.

The object of pasteurization is to kill the bacteria. But there are many kinds of bacteria in milk and some are not so easily killed as others. On this point hinges the question of the length of time required for effective pasteurization. Moreover, the different kinds of bacteria have different influences. On this point hinges the controversy over the wisdom of pasteurizing at all. When it is said that a sample of milk contains one million bacteria per cc. (cubic centimetre), which means a million infinitesimal germs in sixteen drops of milk, it must not be supposed that they are all pathogenic or disease-producing. As a matter of fact, it is probable that few are disease-producing, while a very large number are lactic acid bacteria, which are not only harmless, but useful in that they are Nature's check on the injurious bacteria. Thousands of people who do not know the cause know that milk if kept a certain length of time—the higher the temperature the shorter the time—will sour. Science explains that lactic acid bacteria are the cause. It is also known that milk spreads disease. Science explains that certain pathogenic germs are the cause of tuberculosis, typhoid fever, scarlet fever and diphtheria. They, however, are not killed as easily by pasteurization as the lactic acid germs.

Pasteurization has been in use in the larger dairies on this continent for at least ten or twelve years. It finds greater favour with the large dairy companies than with the small. With few exceptions, the "continuous" process has been used and the main object has been to destroy the lactic acid bacteria in order to prevent souring. In large cities where milk had to be brought long distances and where 24 to 36 hours elapsed before it reached the consumer, this was a material commercial advantage. During recent years more attention has been paid to the value of pasteurization as a means of preventing milk-borne diseases, and then it was found that the existing system was all wrong. A continuous flow of milk over a coil at a temperature of 160 degrees to 180 degrees killed the lactic acid germs and prevented souring, but did not always kill the germs which, if present, spread disease. Many eminent names might be quoted, but it is sufficient to say that the weight of scientific testimony now agrees that nothing short of 140 degrees for twenty minutes will assure absolute immunity from all disease germs, the tubercle bacilli being the most resistant. Some say 140 degrees for thirty minutes or 157 degrees for twenty minutes.

But what of milk after pasteurizing? If only the lactic acid germs are destroyed, then the pathogenic, freed from germicidal restraint, proliferate more rapidly and there is an increase in virulence. If both lactic acid and pathogenic are destroyed, milk cannot be disease-producing without reinfection, but unless the milk is carefully handled, it will in the course of time become putrid, owing to the presence of spores. But the destruction of the bacteria gives an evenness of flavour specially valuable in butter-making. The other question is at to whether pasteurization alters the taste or digestive quality of the milk. While there is con-

siderable diversity of view on these points, the consensus of opinion takes the view that the taste and nutritive quality are not altered to any serious extent. Naturally, the higher the temperature, the more the milk is affected. There still remains to be considered the effect of the dead bacteria; pasteurization only transforms milk "from an aquarium to a cemetery." Roseneau, of the Marine Hospital, Washington, who has done eminent original work on the question, found that dead bacteria injected in guinea pigs proved fatal in a small percentage of cases, thus proving that while not nearly as harmful as when alive, dead bacteria are not absolutely innocuous.

But in spite of its disadvantages, there can be no doubt that pasteurized milk is much safer as human food than raw, dirty milk.



Up-to-date milk house.

MUNICIPALITIES MUST DECIDE.

Looked at from the laboratory standpoint, pasteurization is a splendid modern plan to overcome the modern complications of transportation and delay which beset the milk supply. It is a striking fact that its chief exponents, with the notable exception of Mr. Nathan Straus, of New York, are laboratory men. Among health officers charged with the practical work of protecting their citizens, it has not yet attained the same popularity, doubtless owing to the difficulties surrounding the practical enforcement of such a process. Across the line, Chicago is the only large city to adopt it as a compulsory system, and then only if cattle are not tuberculin tested, and not as a safeguard against other milk-borne diseases. The story of Chicago is set forth in another chapter, but it offers little assistance to Ontario. In our enquiries in this Province, we found little sentiment in favour of pasteurization, and also little information on the question.

For the Province there can be only one ideal—healthy cows, cleanly methods and prompt chilling. This does not mean “certified” milk, but it should mean reasonably clean milk. Any other ideal would be unworthy of the Province. Pasteurization exponents urge that this is not possible and that in any event in the meantime pasteurization should be adopted. The individual municipality must decide this. We do not see any reason why the adoption of a policy of strict and intelligent supervision, as outlined above, should not result in a reasonably safe supply of milk for any Ontario city or town, all of which, with perhaps one exception, have their supply within easy access. In pointing out that milk is a cause of disease and urging sane precautions to prevent its dissemination, it is not necessary to go to the other extreme and regard it as the chief cause of disease, which it is not. The menace of milk to infant life is pointed out in a previous chapter, and the necessity for a special supply in the hot months is urged. Whether that supply is clean and raw or clean and pasteurized is a detail, as both have shown good results. There should be no pasteurization of dirty milk. But raw milk enters into the daily food of the average adult in cities and towns to too small an extent to be any alarming menace to his health. We believe that safe, clean milk is a matter of self-respect as well as self-defence. If, however, a municipality finds, by bacteriological examinations or otherwise, that a strict supervision does not conduce to a safe milk supply, then pasteurization offers the best expedient yet devised.

In any event, it is time municipalities undertook the regulation of pasteurization. Summed up, continuous pasteurization from the health standpoint is a delusion resulting only in false security; proper scientific pasteurization is effective and comparatively non-injurious. If it is to be done at all, it should be done properly. The public should know what it is buying and no milk should be sold as pasteurized unless it has been held at least 140 deg. for at least twenty minutes. Milk which has been raised to 165 deg. for thirty seconds should be sold as “heated” milk and not as pasteurized. In this connection attention is directed to New York labels on another page. A similar legal protection should be extended to the term “certified.”

To pasteurization, the most common objection heard is that it would result in dirty barns and careless methods of handling. This may be a plausible theory but should have no corroboration in actual practice. Pasteurization and inspection are two entirely different things and should not be confused in private thinking or legislative action. Pasteurization cannot make dirty milk clean, though it may render it comparatively harmless. It cannot be too strongly emphasized that pasteurization as an expedient in no way mitigates the fundamental fact that inspection is a sanitary necessity based on a belief in cleanliness for the sake of cleanliness as well as for the sake of protection. If a company desires to pasteurize because its customers want that kind of milk or because the municipality regards it as an essential safeguard, there is the added responsibility on the municipality to see that it is properly done; but there is no less a responsibility on the municipality to maintain a supervision that will assure cleanliness and care at every stage. Unless municipalities desire to undertake the work, which we do not anticipate, the responsibility of pasteurization rests on the individual company; the duty of inspection rests with the municipality. Pasteurization as a substitute for inspection should not be tolerated.

NEED OF CARE BY THE CONSUMER.

But after the producer has done his part, the vendor his and the municipality theirs, there still remains one source of possible contamination. That is after the milk reaches the consumer. Carelessness in the home may undo carefulness at every other stage. What happens after the milk reaches the individual might be no particular business of the State, except that it is often due to ignorance of the delicate nature of the food. The necessity for care is more especially true of the city than the country. In the rural districts, milk is consumed as a rule a few hours after being drawn, while in the city twelve to thirty-six hours elapse before it even reaches the consumer. In the smaller cities and towns where milk is not delivered in bottles, an open dish or pitcher is often left uncovered at the back door. Before being taken into the house, it is almost certain to accumulate dust, if not more serious contamination. Then it is often left standing in a warm kitchen, in a refrigerator which does not refrigerate, or in some other place where it is surrounded by fish, vegetables or onions, the odors of none of which improve the milk. All these things are due to a little thoughtlessness which a clearer understanding of the nature of the milk and its bacterial action would quickly obviate. Especially where it constitutes the chief food of a little child, too much care cannot be exercised in keeping the milk clean and cold.

An apparatus for pasteurizing the milk is now being used in some homes, while other housewives resort to the old practice of heating the milk before using it. It is admitted that boiling injures the nutritive qualities of milk, but there can be little objection to heating immediately before using if the boiling point is not reached.

Only constant care on the part of producer, distributor and consumer will result in a pure, wholesome milk supply. Any steps that may be taken to disseminate and illuminate this fundamental fact, either by teaching in the schools, distribution of literature or delivery of addresses, exhibitions or otherwise, must prove eminently beneficial.

THE QUESTION OF PRICE.

One of the most frequent objections offered to any organized effort at reform in connection with the milk supply is that it "will raise the price." We do not believe a conscientious adoption of any of the suggestions herein made—and we have sought to be more suggestive than censorious—would result in any material increase to the consumer. We have found places in this Province where reforms have been made, but where the consumer pays no more for his milk than in other places where little attention has been paid to the matter. Moreover, milk is one of the best and cheapest of foods. Providing always against the extortions of injurious combines, the price may be left to the general laws of supply and demand. It is important to note, however, that maintaining a sanitary standard in bakeshops has not affected the price of bread nor driven bakers out of business; nor has the inspection of factories raised the price of the articles manufactured or caused manufacturers to retire.

We would respectfully urge that no time be lost in dealing with the matters herein referred to. In a young country of growing population, it is important to start right. For the cities, this means grappling with the semi-social problems of the protection of infantile life and adult life before the matter becomes too large to be easily handled. For the Government of the Province it means giving legislation and leadership to the individual municipalities.

All of which is respectfully submitted.

A. R. PYNE, *Chairman.*

J. R. DARGAVEL.

F. G. MACDIARMID.

W. F. NICKLE,

W. BERT ROADHOUSE, *Secretary.*

Copy of Suggestions which should be Printed in Heavy, Black Type on Strong Linen and Posted in all Dairies.

DEPARTMENT OF HEALTH

THE CITY OF

Rules and Regulations which must be observed by Farmers and Dairymen in the Care of Cows and Handling of Milk shipped to the City of

THE COWS.

1. The cows must be kept clean.
2. Manure must not be permitted to collect upon the tail, sides, udder and belly of any milch cow.

STABLES.

1. Cow stables must be well lighted and ventilated.
2. Floors must be tight and well drained.
3. Manure must be removed from the stalls and gutters at least twice daily. This must not be done during milking nor within one hour prior thereto.
4. Walls and ceilings must be kept clean.
5. The ceilings must be so constructed that dust and dirt therefrom shall not readily fall to the floor or into the milk.
6. Stables must be whitewashed at least once a year.

THE WATER SUPPLY.

1. The water used in the barn and for washing milk utensils must be free from contamination.

THE MILK-HOUSE.

1. A milk-house must be provided which is separated from the stable and dwelling-house.
2. It must be kept clean and must not be used for any purpose except the handling of milk.

THE MILKERS.

1. No person having any communicable disease, or one caring for persons having such disease, must be allowed to handle the milk or milk utensils.
2. The hands of the milkers must be carefully washed immediately before milking.

THE UTENSILS.

1. All milk utensils, including pails, cans, strainers and dippers, must be kept thoroughly clean and must be washed and scalded after each using.

THE MILK.

1. Milk from diseased cows must not be shipped.
2. The milk must not be in any way adulterated.
3. The straining of milk must be done in the milk-house only.
4. All milk must be cooled to a temperature not above 55 degrees within two hours after being drawn, and kept thereafter below that, and must be cooled to 50 degrees or less if not delivered at the creamery twice daily.
5. The use of any preservative or colouring matter is an adulteration, and its use by a producer or shipper will be a sufficient cause for the exclusion of his product from the city of _____.

RECOMMENDATIONS.

In addition to the preceding rules, the Department makes the following recommendations:

THE BARNYARD.

1. It should be well drained and dry, and should be as much sheltered as possible from the wind and cold.
2. Manure should not be allowed to collect in the barnyard and should not be at any time in contact with a stable or milk-house.

THE STABLE.

1. The cow stable should have an abundance of light and ventilation. The ventilation should preferably be from the top.
2. There should be at least 600 cubic feet of air space for each cow.
3. It is desirable that the place where the cows are kept be used for no other purpose. A cow barn should not be used as a storage place for straw, hay or other feeds, or as a waggon or tool house, as the dust and dirt which accumulates in a place of this character is liable to drop into the milk while being drawn.
4. Stable floor should be made tight and be of some non-absorbent material.
5. Cement or brick floors are the best.

as they can be more easily kept clean than wood or earth.

6. If the space over the cow is used for storage of hay, the ceiling should be made tight to prevent chaff and dust falling through. The practice, somewhat common among farmers, of packing hay, etc., on loose poles over the cows is exceedingly bad, since it invites the collection of dust and cobwebs, and the difficulty of keeping the stable clean is increased.

7. The stable should be whitewashed at least once a month.

8. The manure gutter should be from six to eight inches deep and should be kept free from manure.

9. The use of land plaster or lime is recommended upon the floors and gutters.

10. The flooring where the cows stand should be short enough so that all manure will be dropped into the gutter and not upon the floor itself.

11. The floor should be swept at least an hour before milking in order that the dust may have a chance to settle before the milking is begun.

12. If individual drinking basins are used for the cows, they should be frequently drained and cleaned.

THE COWS.

1. The cows should be kept at all times in a healthy condition and an examination by a veterinary surgeon should be made twice a year.

2. The cows should be groomed daily, and all collections of manure, mud or other filth should not be allowed to remain upon their flanks, sides, udders, or bellies during milking.

3. The clipping of long hairs from the udder and the right side of the cow is of assistance in preventing the collection of filth, which may drop into the milk.

4. The hair on the tails should be cut so that the brush will be well above the ground.

5. In winter the tail may be clipped.

6. The cows should be bedded with sawdust, shavings, dried leaves, straw or some equally clean material.

7. The use of horse manure for bedding is to be condemned.

8. To prevent the cows from lying down and getting dirty between cleaning and milking, a throat latch of rope or chain should be fastened across the stanchions under the cow's neck.

THE MILKING AND MILKERS.

1. The milkers should be clean.

2. Their hands should be thoroughly washed with soap and water and carefully dried on clean towels before milking.

3. Clean overalls and jumpers should be worn during the milking of the cows, should be used for no other purpose, and when not in use should be kept in a clean place protected from dust.

4. The hands and teats should be kept dry during milking.

5. The practice of moistening the hands with milk is to be condemned.

6. The first few streams from each teat should be rejected, as this contains more bacteria than the rest of the milk.

7. All milk drawn from the cows 30 days before and 10 days after calving should be rejected, and also all milk from diseased cows.

8. The pails in which the milk is drawn should have as small an opening at the top as can be used in milking. This renders the collection of dust less likely.

9. The milking should be done rapidly and quietly, and the cows should be treated kindly.

10. Dry fodder should not be fed to the cows during or just before milking, as dust therefrom will fall into the milk.

THE MILK.

1. The milk should be removed as soon as drawn to the milk-house and strained and cooled to the proper temperature at once.

2. A good plan is to strain the milk into cans which are standing in ice water which reaches the neck of the can.

3. The more rapidly the milk is cooled the safer it is and the longer it will keep sweet.

4. Ice should be used in cooling, as very few springs are cold enough for the purpose.

5. If aerators are used, they should stand where the air is free from dust or odour, and on no account should they be used in a stable.

6. Milk strainers should be kept exceedingly clean, and scalded a second time just before using, and if cloth strainers are used, several of them should be provided in order that they may be frequently changed during the straining of the milk.

By order of the Board of Health.

SANITARY INSPECTION OF DAIRIES.

DAIRY SCORE CARD.

*Adopted by the Official Dairy Instructors' Association of the
United States.*

Owner or lessee of farm

P. O. addressState

Total number of cowsNumber milking.....

Gallons of milk produced daily

Product is retailed by producer in

Sold at wholesale to

For milk supply of

Permit No.Date of inspection190....

REMARKS

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(Signed)

Inspector.

DETAILED SCORE.

Equipment.	Score.		Methods.	Score.	
	Per- fect.	Allow- ed.		Per- fect.	Allow- ed.
COWS.					
Health	6	.....	Cleanliness of cows	8	.....
Apparently in good health 1			Cleanliness of stables	6	.....
If tested with tuberculin			Floor	2	.....
once a year and no			Walls	1	.....
tuberculosis is found, or			Ceiling and ledges	1	.....
if tested once in six			Mangers and partitions..	1	.....
months and all react-			Windows	1	.....
ing animals removed... 3			Stable air	6	.....
(If tested only once a year			Barnyard clean and well		
and reacting animals found			drained	2	.....
and removed, 2.)			Removal of manure daily to		
Comfort	2	.....	field or proper pit	2	.....
Bedding	1	.....	(To 50 feet from stable, 1.)		
Temperature of stable.... 1			UTENSILS AND MILKING.		
Food	2	.....	Care and cleanliness of		
Water	2	.....	utensils	8	.....
Clean	1	.....	Thoroughly cleansed	5	.....
Fresh	1	.....	Inverted in pure air	3	.....
Light: Four sq. ft. of glass per			Cleanliness of milking	9	.....
cow	4	.....	Clean, dry hands	3	.....
(Three sq. ft., 3; 2 sq. ft., 2;			Udders washed and dried 6		
1 sq. ft., 1. Deduct for uneven			(Udders cleaned with moist		
distribution.)			cloth, 4; cleaned with dry		
Ventilation: Automatic system	3	.....	cloth at least 15 minutes be-		
(Adjustable windows, 1.)			fore milking, 1.)		
Cubic feet of space for cow;			HANDLING THE MILK.		
500 to 1,000 feet	3	.....	Cleanliness of attendants ...	1	.....
(Less than 500 feet, 2; less			Milk removed immediately		
than 400 feet, 1; less than 300			from stable	2	.....
feet, 0.)			Cleanliness of milk room ...	3	.....
STABLES.			Prompt cooling. (Cooled im-		
Location of stable	2	.....	mediately after milking each		
Well drained	1	.....	cow)	2	.....
Free from contaminating			Efficient cooling; below 50° F.	5	.....
surroundings	1	.....	(51° to 55°, 4; 56° to 60°, 2.)		
Construction of stable	4	.....	Storage: below 50° F.....	3	.....
Tight, sound floor and			(50° to 55°, 2; 56° to 60°, 1.)		
proper gutter	2	.....		3	.....
Smooth, tight walls and			(For jacket or wet blanket		
ceiling	1	.....	allow 2; dry blanket or cov-		
Proper stall, tie, and			ered wagon, 1.)		
manger	1	.....		
UTENSILS.					
Construction of utensils	1	.....		
Water for cleaning	1	.....		
(Clean, convenient, and					
abundant.)					
Small-top milking pail	3	.....		
Facilities for hot water or					
steam	1	.....		
Milk cooler	1	.....		
Clean milking suits	1	.....		
HANDLING THE MILK.					
Location of milk room	2	.....		
Free from contaminating					
surroundings	1	.....		
Convenient	1	.....		
Construction of milk room ...	2	.....		
Floor, walls, and ceiling..	1	.....		
Light, ventilation, screens	1	.....		
Total	40	.....	Total	60	.....

Score for equipment + Score for methods = Final score.

NOTE 1.—If any filthy condition is found, particularly dirty utensils, the total score shall be limited to 49.

NOTE 2.—If the water is exposed to dangerous contamination or there is evidence of the presence of a dangerous disease in animals or attendants, the score shall be 0.

SUMMER CARE OF SICK BABIES.

The following circular was prepared for use in connection with Infants' Milk Depot Work by the "Conference on the Summer Care of Babies," representing the Departments of Health and of Education, and fifty hospitals, dispensaries, settlements, and other agencies in New York:

4,500 BABIES DIED in New York City last summer from diarrheal diseases. Most of them died because they were given improper food. They could have been saved if they had been taken to the doctor at the beginning of their illness, and had been properly fed.

In hot weather, two or three loose movements a day, even though the baby seems to be well, may indicate the beginning of serious illness; a doctor should see the baby at once. Remember that it is far easier to keep the baby well than to cure it when sick.

The baby is sick when it vomits or has diarrhea, and it is seriously sick when it has several loose green passages a day containing mucus and curds. Improper food is the cause of such illness; therefore stop all food, give cool boiled water and *take the baby to a doctor at once. In summer it is dangerous to wait.*

BREAST-FED BABIES often vomit or have diarrhea because the mother is sick or tired out and her milk is poor.

Improper food	} weaken the mother and injure her milk.
Irregular meals	
Lack of rest and sleep	
Too frequent or too prolonged nursing	

These causes act especially in hot weather.

NURSING MOTHERS should therefore keep themselves well and their milk in good condition, by eating at regular hours, three plain, well-cooked meals a day, and they should drink water between meals. They should nurse the baby at regular hours. They should keep their bowels regular; constipation in a nursing mother often causes colic in her baby. Large quantities of tea, coffee and beer do not improve the quality of a mother's milk and may be injurious to her baby. *So long as the mother keeps well the baby will be well.*

If the mother is ill or "run down" or the baby has diarrhea and vomiting, she should consult a doctor at once and *before giving the baby other foods or bottle-feeding.* The quality of the mother's milk may be improved by improving her health.

BOTTLE-FED BABIES often have diarrhea and vomiting because the milk used is bad and old, or the feedings are not properly prepared or properly kept, or the nursing-bottles and nipples are dirty.

Bottle-fed babies must be given only good milk which is kept constantly covered and on ice. Use milk furnished by the milk depots or diet kitchens; if the milk stations are not convenient, get good bottled milk which is delivered every morning. *If the milk cannot be kept properly cooled it should be boiled as soon as received.*

Prepare the feedings for the baby exactly as the doctor directs. Feed the baby at regular hours. Each feeding should be heated to a proper temperature in the nursing bottle before it is given to the baby. Taste a spoonful of the milk

immediately before giving it to the baby to be sure that it has not soured. *If the milk is not sweet do not give it to the baby.*

As soon as the bottle used by the baby is empty it should be thoroughly washed with cold water, then cleansed with borax and hot water (teaspoonful of borax to a pint of water). The empty bottles should be put upside down on a shelf. *The bottles should be boiled just before filling for the next feeding.* The nipple should be thoroughly washed after each nursing with hot water, and when not in use should soak in borax water in a covered glass; the nipple must be rinsed in boiling water just before the baby uses it.

CLOTHING.—During the very hot days, or if the baby has fever, remove nearly all the clothing. A muslin slip or gauze shirt is enough. *A baby with fever will not catch cold.*

BATHING.—A baby should have one tub bath every day; on very warm days from two to four general spongings with cool water. If the baby has fever sponge it with cool water every two or three hours and place cool, wet cloths on its head.

FRESH AIR.—Babies, sick or well, must have fresh air. Keep the baby in the largest, coolest room in the house or apartment. Keep as little fire as possible. Keep the rooms free from garbage, soiled clothes and rubbish. Leave the windows open day and night. Avoid the sun on hot days. Select the shady side of the street and the shade of the parks, recreation piers and roofs.

SLEEP AND QUIET.—Keep the baby quiet. Let it sleep alone and let it sleep as much as possible. Lay it on a firm bed, not on feather pillows. Keep the baby and bedclothes clean. Change the diaper and bedclothes as soon as soiled, and sponge the baby with a soft cloth and cool water. If this is done the baby will not be so restless and will sleep better. Do not give “soothing syrup” to make the baby quiet, and do not let the baby hang on the nipple or suck a “baby comforter.”

DIAPERS.—Diapers should be carefully washed as soon as they become soiled, and then dried in the open air. Do not use a soiled diaper a second time before washing it.

MODIFIED MILK MIXTURES FOR WELL BABIES.

These Formulae are those Prescribed and Recommended by the Physicians of the Staff of the Hospital for Sick Children, Toronto.

Formula No. 1—For 1 to 4 Weeks:

16 per cent. Cream, $1\frac{1}{2}$ oz.
Whole Milk, 3-4 oz.
Milk Sugar, 7 drams.
Lime Water, 3-4 oz.
Boiled Water to 18 oz.
Fill 9 bottles, 2 oz. each. Feed every 2 hours.

Mixture, 5 cents.
Bottle deposit, 45 cents.

Formula No. 2—For 2 to 3 Months:

16 per cent. Cream, 3 oz.
Whole Milk, 3 oz.
Milk Sugar, $9\frac{1}{2}$ drams.
Lime Water, 1 oz.
Boiled Water to 24 oz.
Fill 8 bottles, 3 oz. each. Feed every $2\frac{1}{2}$ hours.

Mixture, 7 cents.
Bottle deposit, 40 cents.

Formula No. 3—For 4 to 5 Months:

16 per cent. Cream $4\frac{1}{2}$ oz.— $5\frac{1}{4}$
Whole Milk 9 oz.— $10\frac{1}{2}$
Milk Sugar 12 drams—12
Lime Water $1\frac{1}{2}$ oz.— $1\frac{1}{2}$
Boiled Water to 35 oz.—42
Fill 7 bottles, 6 oz. each. Feed every 3 hours.

Mixture, 12 cents.
Bottle deposit, 42 cents.

Formula No. 4—For 6 to 7 Months:

16 per cent. Cream, $4\frac{1}{2}$ oz.
Whole Milk, $13\frac{1}{2}$ oz.
White Sugar, 1 oz.
Table Salt, small $\frac{1}{4}$ teaspoonful.
Barley Water, to 36 oz.
Fill 6 bottles, 6 oz. each. Feed every 3 hours.

Mixture, 14 cents.
Bottle deposit, 36 cents.

Formula No. 5—For 8 to 9 Months:

16 per cent. Cream.... 4 3-8 oz.—5
Whole Milk 21 7-8 oz.—25
White Sugar $1\frac{1}{2}$ oz.— $1\frac{1}{2}$
Table Salt .. $\frac{1}{4}$ teaspoonful — $\frac{1}{4}$
Oat or Barley Water, to 42 oz.—48
Fill 6 bottles, 8 oz. each. Feed every 3 hours.

Mixture, 16 cents.
Bottle deposit, 48 cents.

For 10 to 12 Months:

Whole Milk.
Fill 5 bottles, 8 oz. each. Feed every 4 hours.

THE STRAUS LABORATORY, NEW YORK.

The formulæ printed on this page are those used by physicians of the Straus Laboratory, New York City. They are prescribed by Dr. Jacobi and other eminent physicians of New York. It is inserted in this pamphlet to show what is being done in this special line in the United States, and for reference and use if desired.

FORMULAE.

Formula for 1st to 4th Week:

$\frac{3}{4}$ ounces of 16 per cent. Cream.
 3 ounces of Full Milk.
 19 ounces of Water.
 $1\frac{1}{4}$ ounces of Lime Water.
 $1\frac{1}{2}$ ounces of Milk Sugar.
 This mixture fills 8 bottles—each to contain 3 ounces. Feed $2\frac{1}{2}$ hours apart.
 Mixture, 5 cents.
 Bottle deposit, 40 cents.

Formula for 1st to 3rd Month:

$1\frac{1}{2}$ ounces of 16 per cent. Cream.
 3 ounces of Full Milk.
 13 ounces of Water.
 $\frac{1}{2}$ ounce of Lime Water.
 1 ounce of Milk Sugar.
 This mixture fills 6 bottles—each to contain 3 ounces. Feed 3 hours apart.
 Mixture, 5 cents.
 Bottle deposit, 30 cents.

Formula for 2nd to 6th Month:

18 ounces of Full Milk.
 $16\frac{1}{2}$ ounces of Water.
 $1\frac{1}{2}$ ounces of Lime Water.
 $1\frac{1}{2}$ ounces of Milk Sugar.
 This mixture fills 6 bottles—each to contain 6 ounces. Feed 3 hours apart.
 Mixture, 8 cents.
 Bottle deposit, 36 cents.

Formula for 3rd to 7th Month:

18 ounces of Full Milk.
 18 ounces of Barley Water.
 1 ounce of Cane Sugar.
 20 grains of Table Salt (less than $\frac{1}{4}$ teaspoonful).
 This mixture fills 6 bottles—each to contain 6 ounces. Feed 3 hours apart.
 Mixture, 8 cents.
 Bottle deposit, 36 cents.

Formula for 7th to 9th Month:

$22\frac{1}{2}$ ounces of Full Milk.
 $7\frac{1}{2}$ ounces of Oat or Barley Water.
 $1\frac{1}{2}$ ounces of Cane Sugar.
 30 grains of Table Salt (about $\frac{1}{4}$ teaspoonful).
 This mixture fills 5 bottles—each to contain 6 ounces. Feed $3\frac{1}{2}$ hours apart.
 Mixture, 10 cents.
 Bottle deposit, 30 cents.

After 9th Month:

Full pasteurized Milk, 8 ounces every 4 hours.

To make one quart of Oat or Barley Water—Boil 2 tablespoonfuls of the flour in a quart of water until it is reduced to half the quantity, then add sufficient water to make up the quart.



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